SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

[*The* MINING JOURNAL *is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.*]

No. 2572.—VOL. LIV. LONDON, SATURDAY, DECEMBER 6, 1884. PRICE (WITH THE JOURNAL) SIXPENCE BY POST £1 4s. PER ANNUM.

BELL'S ASBESTOS.

BELL'S PATENT ASBESTOS BLOCK PACKING for High-Pressure Engines

The following testimonials refer to this Packing:—

Mona Lodge, Amlwich, Anglesey,
2nd August, 1884.

DEAR SIR,—I have much pleasure in answering your note. Bad times in mining have compelled me to try all kinds of expedients in order to effect saving; some have succeeded and some have failed, but my underground manager, Capt. Hughes, has just said to me by the telephone—"The Asbestos Packing is the best thing ever brought here."

It saves money and trouble, but like my gas purifying oxide it lasts so long that you must not expect another order from me for twelve months at least.

Yours truly, T. P. EVANS,
Late H.M. Inspector of Metalliferous Mines.

Mr. J. Bell.

Manchester, Sheffield, and Lincolnshire Railway—Steamship Department,
Grimsby, April 10th, 1884.

DEAR SIR,—I have much pleasure in stating that after a trial of over nine months, and comparing it with other packings, I can confidently recommend your Asbestos Packing. It is especially valuable when high-pressures are employed, as in cases where other packings have perished, owing to high temperatures, your packing has invariably stood well. I have also used it with complete success when a gland has heated with other packings, and also in cases of badly scored piston rods. I consider the results I have obtained by its use for our marine engines to have been in every way highly satisfactory. Yours truly,

G. H. CLARKE, Sup. Engineer.

Mr. J. Bell.

Department of the Director of Navy Contracts,
Admiralty, Whitehall, 20th June, 1884.

SIR,—I have to inform you that your tender has been accepted for Bell's Rolled Cloth Asbestos Packing to sample submitted:—Elastic core ... ... Square.
" " ... ... Round.

To Mr. John Bell. JOHN COLLETT, Director of Navy Contracts.

The Patent Block Packing is square, as Fig. 1 and Figs. 2 and 3 represent the Round Block Packing with solid and hollow rubber core, and Fig. 4 without core, but with rubber inlaid. As these packings are extensively imitated, and as it is a common practice among dealers and agents to supply the cheaper manufactures at my list prices, users are requested to see that the packing supplied to them bears the trade mark.

BELL'S ASBESTOS BOILER PRESERVATIVE.—This useful mixture by absorbing the free oxygen that is in the water entirely checks pitting and corrosion. It also disintegrates incrustation so immediately as to prevent its adhering to the plates. Not only is a great economy of fuel effected by keeping boilers clean, but the risk of having the plates burned is thereby obviated. It has been computed that 1/16 in. thick of incrustation causes a waste of 15 per cent. of coal; 1/4 in., 60 per cent.; 1/2 in., 150 per cent. Thus the Preservative avoids the great risks which are inseparable from scaled plates, lengthens the life of a boiler, and covers its own cost a hundredfold by economy of fuel. It is entirely harmless, and has no injurious action on metals. It can be put into the feed tank or boiler, as may be most convenient. Sold in drums and casks bearing the Trade Mark, without which none is genuine.

BELL'S ASBESTOS YARN and SOAPSTONE PACKING for Locomotives and all Stationary Engines running at very high speed with intense friction. Sandwell Park Colliery, Smethwick, 1st February, 1884.

To Bell's Asbestos Works.

DEAR SIRS,—I have much pleasure in stating that I have used your Asbestos Packing for the last 13 months for our large winding engines which are running night and day, and also for the fan, pumping, and hauling engines at the above Colliery, and during that period we have not used more than one-third the Packing we had formerly; and this I attribute to your Packing on account of its great durability and general excellence of quality.—I am, dear Sirs, yours faithfully,

THOMAS WINTER, Colliery Engineer.

BELL'S ASBESTOS.

The goods of this house are of the highest quality only, and no attempt is made to compete with other manufacturers by the supply of inferior materials at low prices. All "home" orders should be sent direct to the undermentioned depôts and not through Agents or Factors.

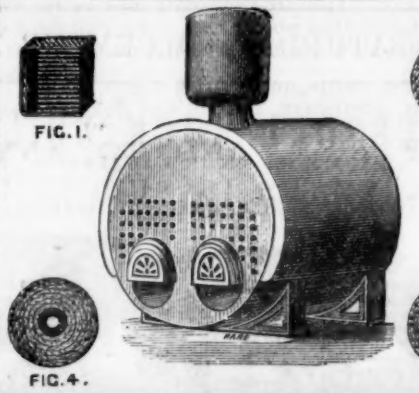


FIG. 1. FIG. 2 FIG. 4. FIG. 3.

BELL'S ASBESTOS BOILER AND PIPE COVERING COMPOSITION, for coating every class of steam pipes and boilers, non-combustible and easily applied when steam is up; adheres to metals and preserves them from rust; prevents the unequal expansion and contraction of boilers exposed to weather; covers 50 per cent. more surface than any other coating, and is absolutely indestructible. It can be stripped off after many years' use, mixed up with 20 per cent. of fresh, and applied again. The composition is supplied dry, and is only to be mixed with water to the consistency required for use.

A Horizontal Boiler, 17 ft. 6 in. long, 15-H.P., gave the following results:—

Temperature on Plates - - - 186 deg.
" " Covering - - 94 deg.

One ton of coal was saved per week, and although the fire was raked out every evening 20 lbs. of steam were found in the boiler next morning.

The following Testimonials refers to this Covering:—

Offices of the Wimbledon Local Board, Wimbledon, Nov. 28th, 1883.

DEAR SIR,—It may interest you to know that we save exactly 40 per cent. in fuel through using your covering. Yours truly, W. SANTO CRIMP, C.E., F.G.S.

The Tamar and Kit Hill Granite Company (Limited),
Gunnislake, Tavistock, 8th April, 1884.

Mr. John Bell, Southwark, S.E.

SIR,—I have much pleasure in stating that the Asbestos covering applied by you to the boiler of our travelling crane at Kit Hill has yielded most remarkable results. Since it has been in use we have saved fully half our coals, and have effected a great saving in the time it takes to get up steam, which is often a matter of great importance to us. I should add that the crane runs on high gantries, and is fully exposed to all weather. I have formed the highest opinion of your Asbestos as used for this purpose, and as you are aware, have had another boiler similarly covered, though it has not since been used. I can most strongly recommend the material.

I am, Sir, yours faithfully, W. J. CHALK, Assoc. M. Inst. C.E., Engineer and Manager.

BELL'S ASBESTOS and INDIA-RUBBER WOVEN TAPE and SHEETING, for making every class of Steam and Water Joints. It can be bent by hand to the form required without puckering, and is especially useful in making joints of manhole and mudhole doors. It is kept in stock in rolls of 100 ft., from 1/2 in. to 3 in. wide, and any thickness from 1/16 in. upwards. Manhole covers can be lifted many times before the renewal of the jointing material is necessary. The same material is made up into sheets about 40 in. square, and each sheet bears the Trade Mark, without which none is genuine. It is very necessary to guard against imitations of this useful material, and to secure themselves against being supplied with these inferior articles at my price, users are recommended to see that every 10 ft. length of the Asbestos Tape purchased by them bears the Trade Mark.

BELL'S SPECIAL LONDON-MADE ASBESTOS MILLBOARD, for Dry Steam Joints, made of the best Asbestos fibre, is well-known for its toughness and purity, and is absolutely free from the injurious ingredients frequently used to attain an appearance of finish, regardless of the real utility of the material. Made in sheets measuring about 40 in. square, from 1-64th in. to 1 in., and 1/2 millimetre to 25 millimetres thick. Each sheet bears the Trade Mark.

The following copy of acceptance of tender refers to above:—

Department of the Director of Navy Contracts.
Admiralty, Whitehall, S.W., 17th May, 1884.

SIR,—I have to inform you that your tender for Asbestos Millboard has been accepted.—Mr. John Bell. JOHN COLLETT, Director of Navy Contracts.

BELL'S ASBESTOS EXPANSION SHEETING (PATENT). This Sheeting is another combination of Asbestos with India-rubber, giving to the steam user the special advantages of both materials. The India-rubber Washer is protected from the action of heat and grease by an outer coating of vulcanised Asbestos Cloth, thus producing an excellent joint where expansion and contraction render other materials unserviceable. This material is admirably suited to steam pipe joints and every class of valve. Valves made of this material are very durable, as they are not subject to injury by oil.

BELL'S "ASBESTOS LUBRICANT."

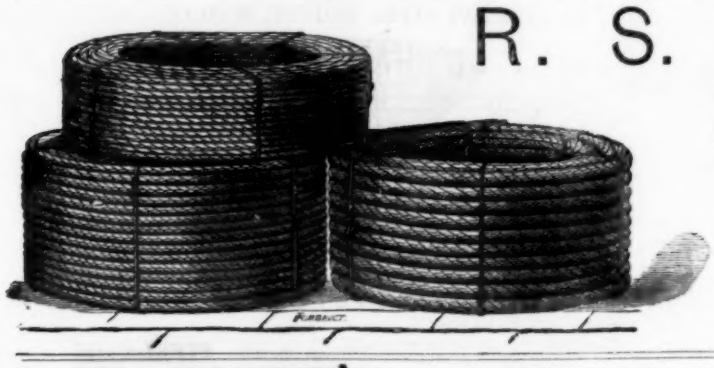
"REG^D"

ILLUSTRATED PRICED CATALOGUE FREE ON APPLICATION TO

BELL'S ASBESTOS WORKS, SOUTHWARK, LONDON, S. E.

OR THE DEPOTS—118a, SOUTHWARK STREET, S.E.,

Victoria Buildings, Deansgate, MANCHESTER. 11 and 13, St. Vincent Place, GLASGOW. 39, Mount Stuart Square, CARDIFF. 21, Ritter Strasse, BERLIN.



R. S. NEWALL AND CO.,

Sole Patentees of Untwisted Wire Rope.

Iron & Steel Ropes of the highest quality for Collieries, Railways, Suspension Bridges, &c.

PATENT STEEL FLEXIBLE ROPES AND HAWSERS.

IRON STEEL, AND COPPER CORDS. LIGHTNING CONDUCTORS.

COPPER CABLES of high Conductivity for Electric Light and Power.

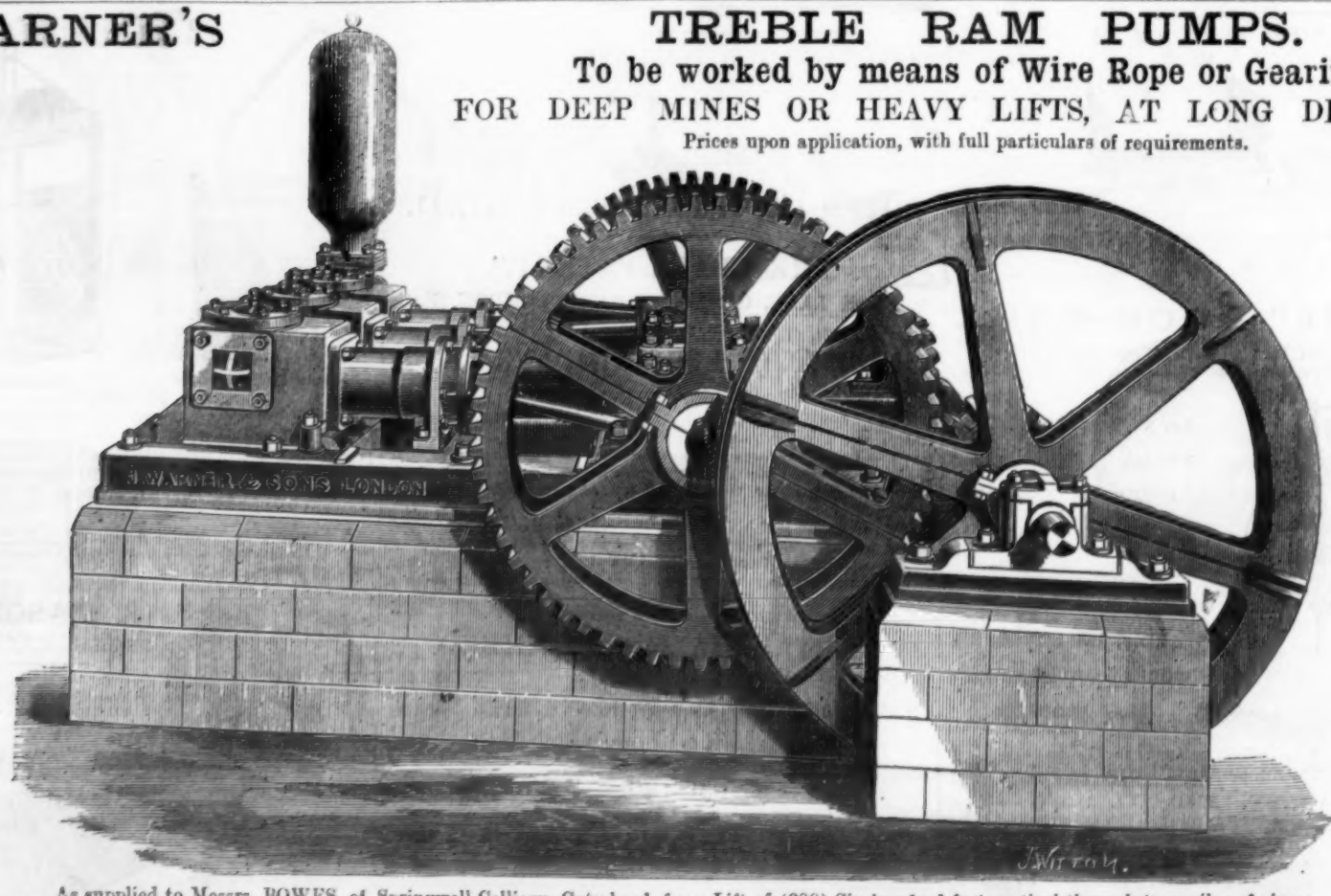
London: 130, STRAND, W.C. Liverpool: 7, NEW QUAY.
Glasgow: 68, ANDERSTON QUAY.
MANUFACTORY: GATESHEAD-ON-TYNE.

WARNER'S TREBLE RAM PUMPS.

To be worked by means of Wire Rope or Gearing.

FOR DEEP MINES OR HEAVY LIFTS, AT LONG DISTANCES.

Prices upon application, with full particulars of requirements.



As supplied to Messrs BOWES, of Springwell Colliery, Gateshead, for a Lift of (600) Six hundred feet vertical through two miles of pipes.

JOHN WARNER AND SONS, THE CRESCENT FOUNDRY, CRIPPLEGATE, LONDON, E.C.

R. HUDSON'S

Patent Steel Trucks, Points and Crossings,

PORTABLE RAILWAY, STEEL BUCKETS, &c., &c.

Telephone No. 14.
In connection with the Leeds Exchange, and all the principal Hotels and places of business in the town.

GILDERSOME FOUNDRY, NEAR LEEDS.

(Near Gildersome Station, G.N.R. Main Line, Bradford to Wakefield and London, via Laisterdyke and Ardsley Junctions.)

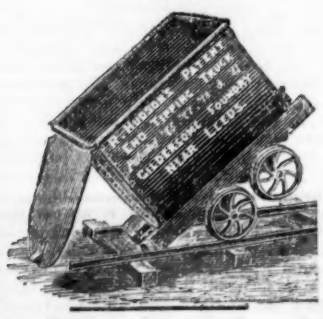
Registered Telegraphic Address:—
"GILDERSOME, LEEDS."
A. B. C. Code used.

UPWARDS of 25,000 of these Trucks and Wagons have been supplied to the South African Diamond Mines; American, Spanish, Indian, and Welsh Gold, Silver, Copper, and Lead Mines; Indian and Brazilian Railways, and to Railway Contractors, Chemical Works, Brick Works, and Coal and Mineral Shippers, &c., &c., and can be made to lift off the underwork, to let down into the hold of a vessel, and easily replaced. They are also largely used in the Coal and other Mines in this country, and are the LIGHTEST, STRONGEST, and most CAPACIOUS made, infinitely stronger and lighter than wooden ones, and are all fitted with R. H.'s Patent "Rim" round top of wagons, requiring no rivets, and giving immense strength and rigidity. End and body plates are also joined on R. H.'s patent method, dispensing with angle-irons or corner plates.

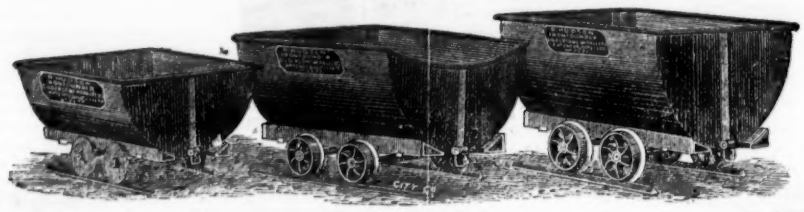
Patented in Europe, America, Australia, India, and British South Africa, 1875, 1877, 1878, 1881, and 1883.
N.B.—The American, Australian, Indian, and Spanish Patents on Sale.

CAN BE MADE TO ANY SIZE, AND TO ANY GAUGE OF RAILS.

1.—PATENT STEEL END TIP WAGONS.

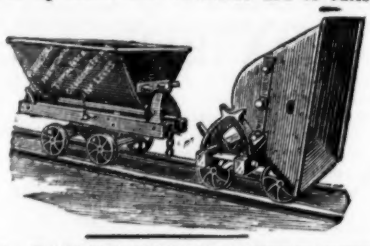


7.—PATENT STEEL MINING WAGONS.

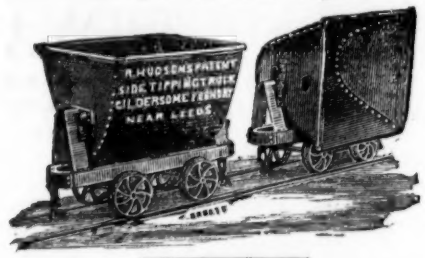


12.—PATENT STEEL HOPPER WAGON, WITH BOTTOM DOORS.

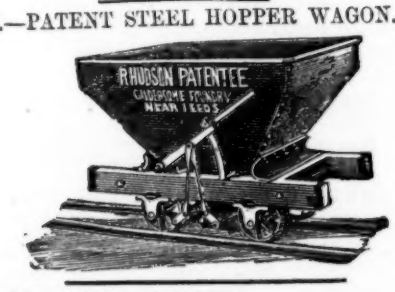
2. PATENT UNIVERSAL TRIPLE-CENTRE STEEL TIPPING TRUCK,
Will tip either SIDE or either END of rails.



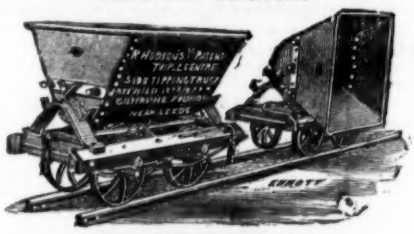
8.— PATENT DOUBLE-CENTRE STEEL SIDE TIP WAGONS,
Will tip either side of Wagons.



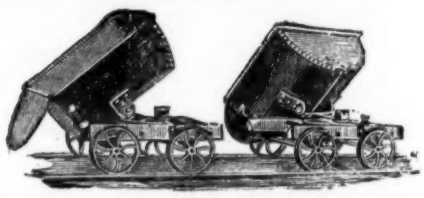
13.—PATENT STEEL HOPPER WAGON.



3.—PATENT TRIPLE-CENTRE STEEL SIDE TIP WAGONS.

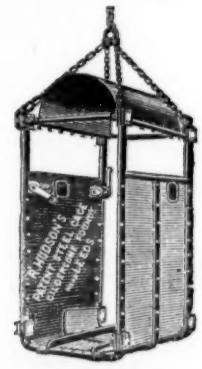


9.—PATENT STEEL ALL-ROUND TIP WAGON.

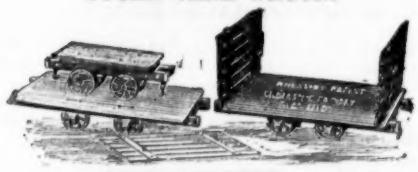


14.—SELF-RIGHTING STEEL TIP BUCKET.
(The "CATCH" can also be made SELF-ACTING if desired.)

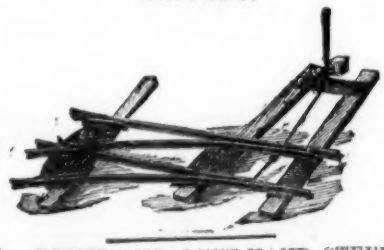
15.—STEEL CAGE.



4. -PATENT STEEL PLATFORM OR SUGAR CANE WAGON.

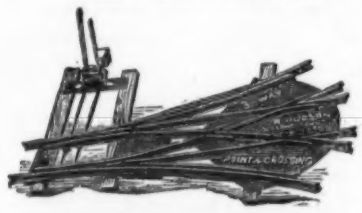


10.—LEFT-HAND STEEL POINT AND CROSSING.



5.—PATENT STEEL CASK.
As supplied to H.M. War Office for the late war in Egypt).
DOUBLE the STRENGTH of ordinary Casks without any INCREASE in weight.
(Made from 10 gals. capacity UPWARDS to any desired size.)

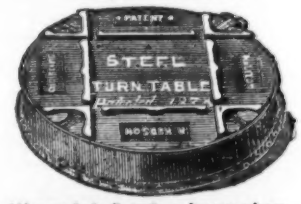
11.—RIGHT AND LEFT-HAND STEEL POINT AND CROSSING.



16.—PATENT STEEL WHEELBARROWS.
Made to any Size.
Lightest and Strongest in the Market.

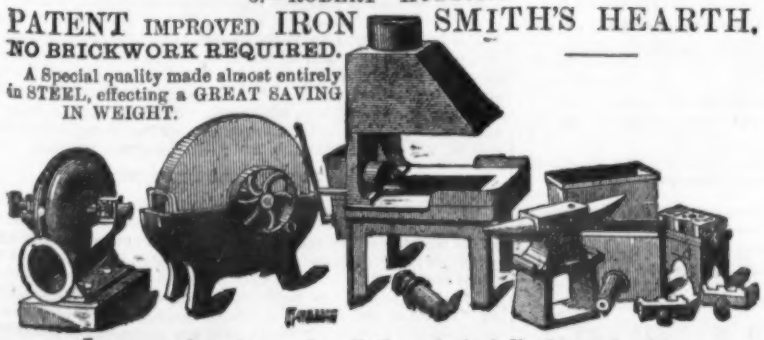
A great success.

17.—STEEL SELF-CONTAINED TURNTABLE.



(Also made in CAST Iron for use where weight is not a consideration.

6.—ROBERT HUDSON'S
PATENT IMPROVED IRON SMITH'S HEARTH.
NO BRICKWORK REQUIRED.
A Special quality made almost entirely in STEEL, effecting a GREAT SAVING IN WEIGHT.



Large numbers in use by all the principal Engineers in this country and abroad.

18.—"AERIAL" STEEL WINDING TUB.

Largely employed in the South African Diamond Fields.

No. 19.—PATENT STEEL CHARGING BARROW,
DOUBLE the STRENGTH & much LIGHTER than ordinary Barrows

ONE man can EASILY tip ANY WEIGHT in these wagons.

ALL KINDS OF BOLTS NUTS, AND RIVETS MADE TO ORDER ON THE PREMISES

MANCHESTER GEOLOGICAL SOCIETY.

The ordinary monthly meeting of members was held at Manchester on Tuesday,—Mr. Joseph Dickinson, Her Majesty's Chief Inspector of Mines, occupying the chair.

Professor Boyd Dawkins, M.A., F.R.S., read a paper with reference to large deposits of apatite near Ottawa, Canada, and in the discussion which followed the Chairman expressed the opinion that the paper would be of great value in directing miners to look out for these particular measures in this country, and he was not without hope that valuable deposits of apatite might be found.

THE OCCURRENCE OF BRINE IN COAL MEASURES.

Mr. De Rance, Assoc.Inst.C.E., F.G.S., read a paper "On the Occurrence of Brine in the Coal Measures, with some Remarks on Filtration." In the course of his paper Mr. De Rance stated that in 1684, or exactly 200 years ago, the occurrence of a salt spring in the Durham coal field was described in the Philosophical Transactions, and that similar phenomena had been noted from time to time up to a recent paper by Mr. Emerson, in which the occurrence of brine in the carboniferous rocks underlying the lias of Northampton was reported to have been recently ascertained in several futile borings for water. In the present communication which he had brought before the society it was his (Mr. De Rance's) endeavour to ascertain in what degree the brine springs of the coal measures differed from those of the Keuper marls, supplying the white salt of commerce, and from ordinary mineral springs. He pointed out that this subject was of interest beyond the mere question of the occurrence of brine springs, in the fact that the sandstone of the coal measures in many districts, like the millstone grits beneath them, were valuable water-bearing rocks for waterworks purposes, storing large volumes of water, and rendering it up often in a condition of great purity, the recent inundation of the Moston Colliery being an example of both these facts, and should it appear that brine springs commonly occurred throughout the coal measures, it would render this class of rock open to suspicion, which at the present time would be a matter for regret, when so few sources of supply of good water were left, and the effect of a few months continued drought had brought about so remarkable a failure of a large number of the gravitation waterworks of the North of England. Analysis of brine from the coal measures were then compared, and special reference made to the brine from Rose Bridge Colliery, near Wigan, analysed by Mr. John Collins, F.C.S., of Bolton, which contained 3514 grs. of chlorides to the gallon, of which no less than 602 grs. were chlorides of potash. As regards general results, the analysis was very similar to a brine spring from a fissure in Dukinfield Colliery, and to brine met with in the Dallam Lane Forge boring in the new red sandstone, which was believed to be derived from the coal measures. These coal measure brines appeared to average about 4000 grs. to the gallon of the total saline contents, or about two and a half times as much as the water of half tide at Liverpool, analysed by Mr. Norman Tate, F.C.S., for Mr. S. Roberts, F.G.S., which contained a total solid impurity of 1558·08 grs. to the gallon, of which 1295·50 were chloride of sodium. The analysis of a number of saline springs, chiefly from the secondary rocks of England and the Continent were given, the average saline contents of which were about 1100 grs. to the gallon, or less than the moderately salt seawater at Liverpool. Brine from the Kueper marls, on the other hand, contained a quarter of its weight of chloride of sodium, as well as other salts, or about 17,506 grs. to the gallon, which was about 11 times salter than the sea at Liverpool. The coal measure brine springs consequently occupied an intermediate place between the mineral springs somewhat less salt than the sea the Keuper brine, which was an important solution. The brine springs occasionally met with in the Triapis sandstone were believed by Mr. De Rance to be derived from the coal measures beneath, and he was of opinion that the presence of brine of coal measure origin had only affected wells and pumping stations made for that purpose in very few instances; yet they were sufficiently numerous to render great care necessary in the selection of pumping stations in these rocks, where nothing was already known of the character of the water which would be yielded. Allusion was made to the investigations of Mr. Wm. Ripley Nicols, Member of the Boston (U.S.) Society of Engineers, which proved that the particles of sand, whether in filter beds or when cemented together and forming sandstones, had no power, as had been imagined, of removing and holding a certain portion of the salts of saline solution filtering through them. Mr. De Rance also described the "revolver" suggested by Sir Frederick Abel, C.B., F.R.S., which had been erected at the Antwerp Waterworks, and in which 2,000,000 gallons of heavily polluted water was daily dealt with, at an expenditure of only 20 lbs. weight iron and a very small amount of power. This was a result of great importance to many works in this country, and experimental trials were already being made.

After a few observations on the value of Mr. De Rance's paper the usual vote of thanks was passed.

NEW SAFETY-LAMP.

Mr. J. S. Martin, Inspector of Mines (hon. sec.), exhibited a new safety-lamp, which had been forwarded to him by Mr. C. E. Rhodes, of the Aldwark Main Colliery, who had put into practical shape the suggestions which had been laid before him by a Welshman, named Evans, who had no experience of mining. In general construction the lamp is of the ordinary Clanny pattern, arranged with two shields—one being of the Smethurst type, similar to that used in the Marsaut and other lamps—and the second, which may be termed an extinguisher, works outside the gauze (being slightly larger than the gauze, and comes into operation when the gauze becomes filled with flame; acting simply as an extinguisher on a candle, that is, it cuts off all air to the flame. This gauze is brought into operation by the burning of a fibre of cotton or other material, which is burnt through immediately upon the gauze becoming filled with flame, and the extinguisher is thus allowed to drop on to the ring encasing the bottom of gauze, and the diaphragm at the top which loses it completely from the accession of air, and puts out the light. Mr. Martin added that his attention had been called to the lamp in connection with the experiments carried out at the Aldwark Main Colliery, reports of which had appeared in Parts 70 and 71 of the Transactions of the Midland Institute; and he was struck with the lamp, which resisted successfully velocities up to 51 ft., which was the maximum that the arrangements for testing the lamps admitted. Mr. Rhodes, the manager of the colliery, which was owned by Messrs. John Brown and Co. (Limited), had kindly explained the lamp, and by his courtesy he had been enabled to bring it before that meeting.

Gas-Engines Worked by the Dowson Gas.—Messrs. Crossley Brothers, of Manchester, whose new works at Newton Heath are driven throughout by eight large Otto gas-engines, developing about 150-horse power, worked by the Dowson gas, have taken out returns of the consumption of coal over a period of 35 weeks, with the result that, including the waste on Sundays of about 5 cwts. for keeping the fire of the Dowson producer going, they find the consumption does not exceed 1·3 lb. of coal per horse-power per hour. We may add that Messrs. Crossley have just completed an Otto engine to indicate 90-horse power, which is the largest gas-engine ever made in this country. It is one of the new double cylinder engines with a very ingenious valve arrangement.

Original Correspondence.

ELECTRIC SIGNALLING INTO AND FROM MOVING TRAINS.

SIR,—Referring to recent correspondence complaining of annoyance caused by the railway whistle and detonating fog signals, I desire to state that we have offered a system which renders their use unnecessary to the authorities of the District line, who declined to try it, on the ground that their signal boxes and stations were so near together the train was hardly ever out of sight of one or other of them, and, therefore, they did not require any other signals than those in use by the Tilbury line, on the ground that they were then too busy to give it a trial; by the Great Western our first application was declined, but on referring it to them again, and attending personally at Paddington, we were told we should have a trial, but that the consent of the directors must first be obtained.

The invention was first tried in January on the Belfast Central, in the presence of Mr. Bucknall Cooper, the engineer of the line, who writes—"I have to-day had the pleasure of witnessing your experiments on electric signalling. I am satisfied that a system of signals could have been kept up between the train and the signalmen in the station by electricity, during the time the train was in motion." In August it was tried on the Tenby line in the presence of Dr. Hopkinson, F.R.S., who was sent down by the directors of the Electric Signal Company to report to them on the invention. He writes—"I carefully verified the working of every part of the apparatus, both from the point of view of the signalman at the station, and from the point of view of the driver on the locomotive. In my presence every part of the apparatus performed perfectly, the signals on the locomotive were unmistakeable, and the contacts were properly recorded upon the drum at all speeds of the locomotive up to 50 miles per hour, the maximum it was practical to obtain."

The drum records the progress of the train automatically, thus keeping a permanent record of each train's journey, and informs the signalman of its position on the line. At a very trifling expense we actuate a semaphore, and ring a bell electrically on the engine or guard's van, or both, and enable the driver to communicate with the signalman, either in front or rear of him in such a way as to entirely obviate the use either of steam, whistle, or explosive fog signals, and that the system can be used either in conjunction with or without the present system of visual signals. CHARLES PRIDHAM.

Vice-Chairman Electric Signal Company.

Hogarth-road, Dec. 2.

SHOT-FIRING IN COAL MINES.

SIR,—My attention has been called to some remarks made in the *Mining Journal* of Nov. 22 on the subject of shot-firing in coal mines, in which it is assumed that the recent lamentable explosion in one of the pits belonging to the Tredegar Iron and Coal Company arose from that cause. It is necessary that I should state in the interests of this company, and colliery interests generally, that after most careful investigation into the circumstances of this explosion there is every reason to believe that it did not arise from shot-firing. I am, therefore, instructed to request that you will kindly correct your statement in the next issue of the *Mining Journal* by the insertion of this letter. EDMUND PETLEY, Secretary.

Queen-street, Cheapside, Dec. 1.

THE PRESENT MINING DEPRESSION.

In an interesting paper read before the Royal Institution of Cornwall on Nov. 27, Mr. R. SYMONS, of Truro, remarked:—The complaint of what is called "bad times" seems to be general. As to mining, when I look round on the abandoned districts which were formerly so prosperous, I am surprised that no more houses are tenantless. The Redruth and Camborne district is the least affected by relinquished mines, but even there the wages have been necessarily reduced in consequence of the poverty of most of the mines. However, in that district dwelling-houses are on the increase. There are only five mines there yielding a profit at present—Dolcoath, East Pool, Wheal Agar, South Condurrow, and Wheal Grenville. Not one of all the others is self-sustaining, but involve a heavy outlay. The shareholders in Wheal Agar exhibited unprecedented tenacity in continuing to work 50 years in adversity; but success at last has crowned their perseverance, and they will probably in a very few years be reimbursed their outlay of about 100,000*l*. It was the contiguity of East Pool riches which stimulated their efforts, despite losses and accidents numerous.

Owing to the reduction of the demand for labour, a large portion of our best miners have emigrated to distant lands, where they are developing mineral properties, the produce from which comes into competition with that of our Cornish mines, and cause the prices to be lower than formerly to the extent of nearly 50 per cent. in copper, tin, and lead. Our copper mines which sold copper on Oct. 2, 1834, were 13 in number; copper ore sold that day 2459 tons; average standard, 113*l*. 11s. Oct. 3, 1884, 50 years later—mines, 4; copper ore sold, 823 tons; standard, 77*l*. 5s. I will show a still greater contrast. The copper ore raised in 1656 amounted to 206,177 tons, of 6 9-16ths produce; whilst in 1882 the total copper ore sold was only 26,641 tons, produce 6¼. Of lead the present production in our county is small and the price low. Of iron the return is very limited, because it will not pay for working at the present price, the quality being low. The Cornwall Minerals Railway was constructed principally for the transit of iron ore from the Perran Mines to Par and Fowey; but very little, if any, is carried on it.

We send to market more tin than we did 50 years ago, because nearly all our late copper mines have become tin mines, but the present price of tin is miserably low, as well as those of copper, lead, iron, &c. Some people are clamouring for what they call "Fair Trade," advocating a return to the imposition of import duties, which means the favouring of one class of the community by throwing the burden on other classes in our own country, for it would fall, of course, on the consumers. Consequent on the low prices at present received for our mineral products, and the illiberal treatment received from the lords and mine promoters, little capital can be raised for fresh works in the county, however promising and "keenly" (as miners say) the lodes may appear, and however numerous and respectable the reporters on mines may be they are not heeded by the disgusted capitalists.

Although the low prices given for our mineral products may be the primary cause of the present depression there are secondary causes which may be assigned for it. One cause was the extravagant prices charged by promoters for the leases during the mania in 1881, when so much as 40,000*l*, or 50,000*l*. was charged for leases of exhausted mines. The capital should be applied to the development if appropriated at all, but in most of the cases referred to it ought not to have been obtained from the credulous speculators. . . . Another cause of discouragement of mining is found in the illiberality of the landowners, whose conditions of leasing have been selfish, oppressive, and absurd. They charge in most cases 100*l*. per acre for land destroyed, not worth half, in some cases not a quarter, of that amount; they charge also a rent in some cases more than the land is worth to a farmer, and that sometimes to be paid in advance; they compel the miner to yield up to them at the end of his occupation all the buildings erected by the miners on the property, and that in good repair, without consideration. They sometimes charge a premium for the lease, which is made to contain covenants unreasonably interfering with the discretionary action of the manager of the mine, and notwithstanding all these impositions they look upon the grant as a favour, whereas they are the favoured parties. I am pleased, however, to see the shadow of better things, the lords are beginning to show some evidence of a change for the better, and I think that by-and-bye we shall be able to obtain grants of mineral lands upon fair conditions, and probably better conditions would have obtained in past times if the lessees had contended for them by reasoning with the lords, or their agents, against those conditions now in force.

A word as the future of mining in our county. Because our mining districts are mostly desolate—Breage, Crowan, Wendron, Marazion, Lelant, Gwennap, and St. Austell—we hear people say, "Mining in Cornwall is nearly done; its resources are exhausted—worked out." I would quote the words of comfort which are sometimes expressed to a discarded lover—"There are as good fish in the sea as ever came out of it," and I believe that we shall have in the future discoveries of mineral as valuable as any of the past. The author of Nature has wisely and graciously made the metallic wealth a hidden treasure to be sought after by successive generations.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—No. II.

Some of the early experience appears to have been more sensational than pleasant, for Mr. Darfee says—I had been but a short time in Wyandotte before I came to know that I was regarded as little better than a mild sort of lunatic, or as a confirmed idiot, who might be tolerated, but not for a moment encouraged, still less assisted. Indeed, the great Herr Unkunde Unheilschwanger, then the leader of metallurgical thought and practice in the vicinity, formulated the popular belief by openly declaring that, "if that —— Yankee expected to blow cold air through melted iron and not have it chill up he must be a —— fool." In the earlier plant an elliptical well—or more properly a reservoir—was located beneath the rear platform of the reverberatory furnace. A pipe conveyed water to this reservoir, and care was always taken (except in the following described instance) to have it filled with water before the commencement of a blow. The purpose of the well was to receive any steel that might remain fluid in the casting ladle, in case its tap-hole should chill. If the well was full of water it was a perfectly safe operation to turn 2 or 3 tons of fluid steel into it, thus cooling it in small shots, and more or less irregular masses of manageable size, which could be utilised in various ways; whereas had the metal chilled solid in the casting ladle, the result would have been a mass of such dimensions as was practically valueless at the time in that locality. With this well is associated a comedy which came unpleasantly near being a tragedy. After several conversions had been made in the works I was called to Chicago, and left Wyandotte with the intention of being absent about a fortnight. Having no expectation that the works would be operated until my return I left my assistant for the time being charged with the supervision of certain repairs, among which was the relining of the converter, an event which occurred at unprofitably frequent intervals. The first knowledge that I received that my assistant had got into trouble at Wyandotte was conveyed in a letter from Captain Ward, which read:—"Dear Sir,—I wish you would come immediately to Wyandotte, and look after that man X——, of yours. He will kill somebody by-and-bye. (Signed) Yours truly, E. D. WARD." I returned at once to Wyandotte, and ascertained that my assistant, at the request of Captain Ward, had attempted to run the works for the benefit of a large excursion party that he had brought down from Detroit on one of his steamers. With this party were the late Senators Wade, of Ohio, and Chandler, of Michigan, together with sundry judges, bankers, and merchants of repute. I learned that my assistant had treated the captain's distinguished guests in rather an unceremonious manner, for, having been unfortunate enough to have the tap-hole of the casting ladle chill after successfully teeming two ingots, he ordered the ladle emptied into the well, which he had neglected to fill with water; and the result of turning 2 tons of fluid steel upon about a barrel of water which chanced to be in the well was a terrible explosion, the metal flying in all directions. Senator Chandler was prostrated at full length in the pig bed; Senator Wade was projected upon a pile of sand in a corner of the casting-house; others of the party were more or less burned and otherwise injured, while Capt. Ward himself was blown bodily through the open doors of the building into the yard upon a pile of pig-iron. For a time everything was confusion, but it was soon ascertained that by great good fortune no one of the visitors was seriously hurt, and they all returned to Detroit thoroughly of the opinion that they did not care to see steel made by the "new process" again.

Twenty years have elapsed since the first Bessemer steel was made in the experimental works at Wyandotte, and that time, improved by the labours of skilful men from among our engineers, metallurgists, and chemists, has wrought wondrous changes in the construction and management of our steelworks, rolling-mills, and furnaces. Practices which 20 years ago were condemned as criminal extravagances are now regarded as essential economies. Things deemed impossible by men of little faith then are but the common occurrences of to-day. Buildings, machinery, methods, have all felt the influence of the spirit of progress. Science has become better acquainted with art, and art has a better appreciation of science; and their united forces are marching for ever forward. Before their steady advance difficulties vanish, obstacles are surmounted, and seeming impossibilities are overcome; sound principles are established in place of empericisms, and educated skill replaces laborious ignorance.

The ORIGINAL BESSEMER STEEL PLANT AT TROY was described in an interesting paper by Mr. ROBERT W. HUNT, of Troy, New York, which supplied a record of the plans and practice of the first Bessemer plant that made a commercial success in America, and, taken in connection with that of Mr. Darfee, possessed considerable additional interest by drawing attention to the wonderful progress which has been made in this march of metallurgy during the last 19 years. As we propose publishing the paper complete in an early issue, we will refrain from going into particulars in this connection.

The papers were discussed by Mr. Holloway, the President-elect, of Cleveland, who, after dwelling on their value, recited an amusing little incident relating to the early introduction of the Bessemer process in this country, which came under his notice. Mr. Himrod, a leading Ohio blast-furnace man, gave expression to the opinion that the outlay for machinery for a Bessemer plant which the Cuyahoga Steam Forge Company were then furnishing for the Cleveland Rolling Company was outrageously in excess of what that simple process required. When pressed to give his reasons for such a decision, Mr. Himrod stated that it was in reality only a question of agitating the bath of molten metal, which could be accomplished by much simpler means. He had gone into the thing, and had made experiments. When urged for details he stated that he had borrowed a ladle from an adjoining works, and had run pig-iron into it from his furnace. He fastened a potato to the end of a rod and stuck it into the bath, with the result, as he triumphantly confessed, that it had made a bullaballoo. Mr. Stirling and Mr. P. Barnes related their experience in connection with the early Bessemer works at Troy, and Mr. R. W. Hunt then gave some highly interesting data on blows recently made in the Clapp-Griffith stationary converter at the works of Oliver Brothers and Phillips, of Pittsburgh. The metal made in it, as remarked by Mr. Hunt, is remarkably low in carbon, and possesses the important quality of welding, very well boiler tubes of very good quality having been made of it.

In order to test the question as to what extent the employment of a cinder tap made it possible to use inferior pig, Mr. Hunt blew a mixture of 50 per cent. of a pig-iron containing 0·9 per cent. of phosphorus and 50 per cent. of average Western Bessemer pig. The steel made contained 0·54 per cent. of phosphorus, 0·0065 per cent. of silicon, 0·08 per cent. of sulphur, and 0·12 per cent. of carbon. It worked well, and bent cold double. Cast into a 7 in. ingot, rolled into a billet and then into a ½ in. rod, a test showed a tensile strength of 74,000 lbs., an elastic limit of 62,000, an elongation of 25·25 per cent., and a reduction of area of 48 per cent. Five more tests were made, the results of which have not yet come to hand. One test, however, was made from a sprue from the bottom of an ingot rolled to a ½ in. rod, and yielded a tensile strength of 78,000 lbs., and an elongation of 28 per cent., results that are justly regarded as astonishing. These results confirm the good accounts from Europe in regard to the use of small converters for special work. It is, of course, well known that for decades fixed converters have been in use in Sweden to make a high quality of metal, but they laboured under the drawback that blowing had to be continued until the steel was ready for tapping. The Clapp and Griffith converter is so arranged that the tuyeres can be practically closed by plugs at the end of the blow. The blowing-engine required is comparatively small, one English works using only from 4 to 4·5 lbs. pressure of blast. In South Wales and in Leeds Clapp and Griffith converters have been running for upward of a year without interruption, the product being used for sheets and for screws. Very soft steel running from 0·03 to 0·04 per cent. of carbon is aimed at, the recarbonising being accomplished with from 5 to 6 per cent. of 70 per cent. ferro-manganese. The capacity of the converter is comparatively great, from 1 to 1·5 ton charges requiring from 28 to 29 minutes, so that on an average from 12 to 15 blows can be made in an 8 hour shift. The repairs of the bottom, which consist of square tuyere blocks, appear to be light, the bottom being changed once a week.

A NOVEL HAMMER-HEAD AND DIE was described in a paper by Mr. WILLIAM HEWITT, of Trenton, New Jersey, in which he remarked that in the ordinary construction of steam hammers the head and die are usually secured to the piston-rod, which is slightly tapering at the end by means of keys applied to a slot in the connection between piston-rod and head, and a dove-tail joint in the connection between the head and die. The objection to this and other modes of connection by means of keys is that the unequal expansion and contraction of both the head and die continually knocks the keys loose—no matter how tight they may be driven—necessitating frequent stoppages to tighten up, which are sufficiently annoying in themselves even if they do not lead to more serious consequences, such as the bursting of a head or cracking of a die; and although these parts are generally made of cast-steel such events are not of uncommon occurrence, especially in shingling where foul blows are frequent. The hammer-head is secured to the lower extremity of the piston-rod by a tapering split ring and a circumscribing wrought-iron band. A series of lugs project radially from the exterior face of the lowest portion of the head, and a corresponding series of lugs project similarly from the exterior face of the uppermost portion of the die, the two series of lugs in the set of the parts being so disposed as to be vertically aligned in corresponding parts. In joining the parts, the wrought-iron band is first shrunk upon the head to keep it from fracturing, and the head with the band shrunk upon it is then heated to a red heat. The tapering sleeve or ring, which is split like a piston-ring, is now slipped over the end of the piston-rod; the head while red hot is place around this, and the die placed so that the lugs on it come directly opposite those on the head. The tapering ring is then driven down tightly with a sledge, the head left to cool, and, finally, the bands are shrunk around the lugs. The opposing faces of the lugs are faced off or bevelled, so that they do not touch in the contact of the die with the head, in order to provide against the possibility of their receiving or sustaining any portion of the shock from the blows of the hammer which otherwise would break or destroy them. The bands around the lugs in shrinking are, of course, subjected to an enormous tension, which retains them fixedly in position and holds the die immovably in place until it is worn out, when it is removed by cutting the bands and replacing by a new die. The hammer-head on cooling shrinks sufficiently, as practice has proved, to prevent the tapering ring from slipping or shaking loose. A leather washer is placed between the end of the piston-rod and die to provide for a slight amount of elasticity and ameliorate somewhat the force of the severe blows. The tendency of the blows is to drive the tapering ring in tighter, and the force thus exerted outwardly against the head is so great that it would soon break it if it were not for the wrought-iron band which effectually prevents this. The head and die are made of cast-iron.

In the discussion which followed the reading of the paper, Prof. SWEET remarked that he thought that the rod might taper into the head without a separate tapering ring, one part less thus being needed; but changed this opinion when Mr. Davis pointed out that the tapering ring served a good purpose, inasmuch as its bottom is above the head, thus admitting of some give. Mr. Davis further stated that in the shops with which he was connected—those of the Philadelphia and Reading Coal and Iron Company—they had several large hammers without the leather referred to by Mr. Hewitt, which had lasted well for five years. The weight of one of these hammer-heads was 650 lbs.

THE INSTITUTION OF CIVIL ENGINEERS.

At the meeting on Tuesday—Sir J. W. BAZALGETTE, C.B., President, in the chair—it was announced that the Council had recently transferred Guybon Damant Atherstone, George Burton Chadwick, Henry Tanner Ferguson, Bennett Fitch, John Bailie Henderson, Alexander William Jardine, Henry Kemp, Edward James Moore, Joaquim Galdino Pimental, Edmund Walter Plunkett, Frederick Stafford, and George Henry Stayton, to the class of members; and had admitted

William Alexander, James Philip Bentley Anley, Alfred Henry Aslett, Percy Adrian Aubin, Walter Banks, Joseph William Barker, Frederick William Bickford, John Vaughan Brenchley, Arthur William Brightmore, B.Sc., Arthur John Burgess, Henry Robert John Burstall, Wh.Sc., George Henry Butler, Alfred Earnest Caldicott, Daniel Campbell, jun., Alan Archibald Campbell-Swinton, David Sing Capper, M.A., John George Carew-Gibson, Allan John Chew, Charles Henry Colson, Clarence Craig, Richard Smith Davenhill, Charles Edward Davenport, John Davy, Albert Denison, Mark Edward Drury, James Rammell Easton, Frederick Charles Fairholme, Herbert Forbes Felton, John Fielding William Clarence Folkard, Hugo Robert Ford, Lawrence Gibbs, Henry Jesse Gooch, Robert Green, Ernest Edwin Hammett, Robert Francis Hayward, William Hemingway, George Hewson, Herbert Hinds, Henry Leonard Hinnell, George Alexander Hobler, Charles Ernest Hodgkin, William Oswald Hodgkinson, Arthur Edwin Hopper, Robert Holden Housman, Gilbert Hunter, George Frederick Jackson, Herbert Innis Jacques, Reginald William James, George Tremayne Vivian Keeling, Arthur Edward Kindersley, John Knox, Charles Frederic Lawson, Lucien Alphonse Legros, John Harry Lewis, Joseph Augustus Marrot, Herbert Augustus Marshall, Walter Richards Martin, Alvaro Gomes de Mattos, Henry Ward Middlemist, George Percival Milnes, Hugh McPherson Mitchell, Francis Sanders Morris, Harold Morse, Hector Douglas Munro, Albert Edward Nichols, John Edward Nobbs, Trenham Old, Francis Joseph O'Reilly, Arthur Leopold Paterson, Robert Peirce, Walter Armstrong Richards, Leslie Stephen Robinson, Patrick Johnston Ross, Frederick Henry Rowling, Lionel Saltmarshe, Edward Sandeman, Frederick Scullard, Edward Carstensen de Segundo, Andrew Cree Shaw, Wh.Sc.; Herbert Shaw, Ivon Algernon Sparks, John Bowring Spence, Arthur Edwin Slade Templeton, B.A.; Vincent Harold Turner, Walter Frederick Vinter, B.A.; George Waddell, James Watson, Ernest Charles Whichcord, Arthur Henry Whinfield, Charles Henry Wordingham, and Chosaku Yoshimura, as Students of the Institution.

At the first monthly ballot of the session 1884-85, John Stuart Beresford, P.W.D., India; Charles John Bond, South Indian Railway; Archibald Constable, Oudh and Rohilkund Railway; Elmer Laurence Corthell, M.A., New York; Scrope Berdmore Doig, P.W.D., India; Erasmus Henry Mauritius Gower, Selangor, S.S.; Thomas Alfred Hearson, R.N., Cooper's Hill College; John Thomas Key, Sheffield Gas Company; James Murdoch Napier, Lambeth; Harry George Palliser, P.W.D., Bombay; Thomas William Pearson, G.I.P. Railway; John Joseph Platts, Odessa Waterworks; Walter Rowley, Leeds; William Smith, Harbour Engineer, Aberdeen; and Edward Wasell, City Engineer, Winnipeg, were elected Members.

Thomas Anderson, Dockyard, Bombay; Lawrence Hennessey Clubby Armstrong, Sukkur; George Iden Austen, Stud. Inst.C.E., Smarden; Thomas Richard Bayliss, Birmingham; James Fettes Boulton, Stud. Inst.C.E., Aberdeen; Francis Boynton, Stud. Inst. C.E., Westminster; Edward Henry Bramah, Rio de Janeiro; James Brigden, L. B. and S. C. Railway; James Beaumont Buchanan, P.W.D., Hyderabad; Roderick Edmond Carter, Stud. Inst.C.E., P.W.D., India; John Edward Compton-Bracebridge, Stud. Inst.C.E., Whitehall; William Bateman Crichton, Chiswick; Alexander Dempster, Elland; Robert Dempster, sen., Elland; John Hugh Dodd, P.W.D., Jamaica; David John Russell Duncan, Queen-Victoria-street; David Thomas Fender, Westminster; John Coleman Fergusson, Shanghai; Eduardo de Moraes Gomes Ferreira, Stud. Inst.C.E., Pernambuco; George Septimus Firth, Stud. Inst.C.E., Bolivia, N.S.W.; Wm. Froggatt, Sheffield; Frederic Gleadow, Stud. Inst.C.E., Hull; Percy Murly Gotto, Stud. Inst.C.E., Rio de Janeiro William Banks Gwyther, P.W.D., India; Henry William Hargrave

Stud. Inst.C.E., Adelaide; Charles Cornelius Henshaw, New Wandsworth; Robert Swan Highet, Stud. Inst.C.E., East Indian Railway; John Wykeham Jacomb-Hood, Stud. Inst.C.E., L. and S.W. Railway; Cosmo Charles Hooley, Barton-upon-Irwell; John Isidor de Jongh, Costa Rica; Algernon Leventhorpe, P.W.D., India; Graham Rigby Lynn, Bombay; Angus Roderick Macdonald, Stud. Inst.C.E., P.W.D., India; Thomas John Malcolm Macfarlane, Stud. Inst.C.E., Natal Government Railways; James Kenneth Douglas MacKenzie, Westminster; Raynes Lauder McLaren, Stud. Inst.C.E., Blackheath; Duncan MacPherson, Canadian Pacific Railway; Horace Richard Marwood, Stud. Inst.C.E., Cape Government Railways; Percy William Mavor, Linares; David Morris, P.W.D., India; Robert John Courtenay Mostyn, Thames Conservancy; James Abbott Oxley, Great Southern Railway, Buenos Ayres; William Vye Paddon, Stud. Inst.C.E., Durban; Charles Stuart Russell Palmer, Stud. Inst.C.E., P.W.D., India; John Sinclair Pirrie, Bombay; Joseph Thomas Pullon, Tucacas; John Henry Punchard, Stud.Inst.C.E., Ceará; Harry Vaughan Rudstone Read, Stud.Inst.C.E., Westminster; John Lambe Rigden, Stud. Inst.C.E., Natal Government Railways; John Mitchell Salmond, P.W.D., India; Herbert Arthur Scratchley, Algeria; Frank Henry Shuttleworth, Littleborough; Edgar Smart, Stud. Inst.C.E., Stoke Newington; Henry Smith Pimlico; Francis Wakefield Spencer, Stud. Inst.C.E., Leamington; Bernard O'Driscoll Townshend, Southsea; John Harrison Turner, Stud. Inst.C.E., Wandsworth; Thomas Harman Tyndall, P.W.D., India; Theodore Vachell, Cardiff; Herbert Walker, Nottingham; Leonard Wigan, Hull and Barnsley Railway; William Wood, Stud. Inst.C.E., Epsom; Alfred Woodhouse Bridgewater, and Oswald Vavasour Yates, P.W.D., India, Associate Members, and

David Doig, Westminster; Alfred Lass, Gracechurch-street; Donald Nicoll, Charing-cross; Capt. George Charles Parker, late Indian Navy, Kurrachee; Frederic Charles Raven, Melbourne; and William Watson, Dublin, Associates.

ZINC MINING IN THE UNITED STATES.

While it is the opinion of those who are well able to judge that the ore for zinc manufacture in the United States is equal to the best in Europe, the present status of zinc mining and metallurgy there cannot be said to be very satisfactory. It has been stated that the methods of smelting are crude and extravagant, and fully a generation behind European practice in technical value and economy, and that the methods of mining the ore are extremely wasteful. From the report of Mr. F. L. Clerc to the United States Geological Survey it seems that the present sources of ore supply may be grouped into three divisions—the eastern, including New Jersey, Pennsylvania, and Virginia; the middle, including Wisconsin, Illinois, and Tennessee; and the western, including Missouri and Kansas. In the eastern division the most notable deposit of zinc ore is near Franklin, New Jersey. The principal mine is on Mine Hill, and is reached by a tunnel about 75 ft. below the outcrop, and has a width of from 40 to 50 ft. The ore is easily mined and requires little selection, and the cost of mining and putting it on cars should not exceed the cost of quarrying an equal amount of limestone. An average sample contains about 36 per cent. of oxide of zinc, 22 per cent. metallic iron, and 11 per cent. metallic manganese. It is, owing to the large percentage of iron and manganese, unfit for the manufacture of spelter, but is particularly adapted for the manufacture of "zinc white," for which purpose it is exclusively used. A similar vein on Mine Hill, called the "front vein," has been proved for several hundred yards; it varies from 8 to 20 ft. in width, and is occasionally pinched out by the wall rocks; it carries a less proportion of zincite and a greater proportion of calcite than the large vein, but its ores are of a similar character. The shipments of zinc from New Jersey county for the year 1882 were reported by the State Geologist to be 40,138 tons, and the total output up to the present time can safely be stated at upwards of 250,000 gross tons.

The zinc deposits in the Taucan Valley, Lehigh county, Pennsylvania, which were once extensively worked, now produce little ore. Three principal deposits have been discovered known as the Ueberoth, Hartman, and Saucon Mines. The Ueberoth Mine was worked from 1853 to 1876. Timbering the mine was a great difficulty, but the greatest obstacle to be overcome was the water. The Hartman Mine was worked at first exclusively for calmine. Its exploitation gradually exposed a central horse of blende. The water in the Hartman was always less strong, the pitch of the crevices less steep, and the surrounding rock less disturbed than in the Ueberoth Mine. At the Saucon Mine, when the rich deposit of calamine first discovered was apparently exhausted, the sublease under which it was worked was surrendered, and the mine came into the hands of the Bergen Point Zinc Company, by whom the mine has since been worked. The ores of this region are remarkably free from lead, arsenic, and antimony, which fact gives them their principal value and interest, and has been the basis of the very high reputation of the metal and oxide obtained from them. In Wythe county, Virginia, along New River Valley, zinc ore is scattered over the surface of the ground, and, in connection with lead ores, several thousand tons have been mined.

In the middle district Illinois and Wisconsin are the principal producing regions. At La Salle zincworks have been established which caused quite a revolution in the trade. The lead regions around Galena, Dubuque, and Mineral Point had long been known and extensively worked, and large quantities of zinc ore had been discovered in prospecting. Thousands of tons were stowed away in abandoned drifts and other places, and for years ore was to be had for very little more than the cost of loading and hauling it to the smelters. Gradually the ore already mined became exhausted, and as the richest deposits of lead ore were worked out zinc ore began to be mined for its own sake. Southern Wisconsin and the Galena district are still important zinc-producing centres, but far larger amounts of ore are drawn from the still richer lead regions further west. In Tennessee, near Knoxville, and elsewhere, deposits of zinc ore have for many years been intermittently worked, and considerable amounts of ore have been calcined and shipped to eastern smelters.

In the western division the lead and zinc region of south-west Missouri is known to embrace the greater portion of Greene, Dade, Lawrence, Jasper, Newton, and McDonald counties. Throughout the whole of this region both lead and zinc has been found, but the most productive district, and the only one worked at present, is the northern half of Newton county, the southern half of Jasper county, and the eastern end of Cherokee county, Kansas, and the area drained by the three streams, Centre Creek, Turkey Creek, and Shoal Creek. The importance of this region as a source of zinc ore dates from the year 1871. The towns of Granby on the south, and Joplin on the north, are the centres of the mining activity. The towns of Galena and Empire were brought into prominence in 1878, by the exertions of two land companies, which, on the strength of two or three rich but undeveloped prospects, laid out two rival towns, and sold town lots without reserving mineral rights, and by advertising created an excitement which had a purely speculative basis, but led to the collection of a large number of miners and a considerable aggregate of money. Fortunately the results very nearly justified their most sanguine representations. The land companies then withdrew all of their remaining lots from the market, and the success of the mines was secured. They are now the principal mines for lead ore in the region, and their output of zinc is increasing. Within the last few years three railroads have built branches through the ore fields to each of the three towns, Joplin, Webb City, and Galena. Granby, 20 miles south-east of Joplin, is dependent on a single railroad which owns much of the mining land. The zinc ore obtained is mainly calamine, but blende is also found. The method of mining is not all satisfactory. When a good prospect is discovered the ground is leased by a number of individuals, who organise various mining companies. These companies have the land divided up into lots, 200 ft. square, and a plat of it made, select certain lots for themselves, and throw the others open to miners. When ore is struck it is drifted on and followed in all directions up to the boundaries.

The great defects are the absence of system, the useless duplication of machinery, the cheap, yet expensive expedients, and the crowding together of conflicting operations. Below ground things are worse than above, if that is possible. Each lot is affected by the policy of its neighbours; pillars are only left where they are thought to be absolutely necessary. Each miner tries to get as much as possible out of his own lot. The roofs and pillars are badly trimmed, and in many cases dangerous, fatal accidents being distressingly common. When it is borne in mind that the American production of spelter is less than one-seventh of that of Europe, while the average yield of ores treated by them is nearly twice as great as that of the whole of Europe, and nearly three times as great as that of the ore treated in Silecia, whose metal rules the price of spelter in the world's market, it will be evident that many changes must take place before it can be said that the Americans are making the most of their opportunities.

RELATION OF ELEGANCE TO STRENGTH IN MACHINERY.

It is unfortunately true, writes Mr. T. P. Pemberton, that the idea that elegance is allied to weakness, if not synonymous with it, is far too prevalent. It finds expression in the constant association given to "rudeness" and "strength." Some men seem to despise neatness and beauty, and boast of the rough and inelegant appearance of their productions, as if these features were the certain indications of utility and durability. The fact is that a thing may be very ugly, and yet very worthless; it may be very rough, and yet utterly incompetent to bear severe strains, and it is certain that if the lines of any structure violate the principles of good taste they must also violate those principles which must guide us if we would secure strength and rigidity. Because a machine will not be seen always by critical eyes is no reason why there should be a disregard to symmetry and pleasing outline. And yet we constantly see machinery turned out rough and ugly in appearance, because it is to operate in some obscure place; castings are left rough and poorly cleaned; surfaces are unplaned and unfinished, and paint will often cover a multitude of imperfections. We have seen engines with eccentrics and eccentric straps finished, but the rods left as they came from the hands of the blacksmith. Curious enough, the eye will detect such slovenly work, and attempts to cheapen almost at the first glance. Such incongruities mar the whole appearance. We are told "it would not pay;" that "the machine will work just as well;" that "the machine is going where it won't be seen;" that "it is going among a rough lot," &c. Now, let us not be misunderstood. If a machine is going into a mine, or is to be placed where the surroundings are wet, dusty, or dirty, it would be folly to finish and polish; but there is no reason whatever why the general design—the form of frames and rods and plummer blocks and boiler fittings—should be unshapely masses of metal.

It is a curious fact that almost all the lines developed by a careful analysis of the forces required to resist strains are beautiful curves—chiefly those derived from conic sections. Let us, for example, examine the form of a tree as developed by the efforts of Nature to resist the powerful strains exerted upon the stem by the winds. We find no straight lines here. From the point where it divides into branches and forms the head, to the point where it is anchored to the soil, the outline of the stem forms a beautiful curve; there is not a straight line about it. Gradually, as it descends, it increases in size; but not in a ratio corresponding to the distance passed over, for the power of the wind to snap it off does not so increase. It increases exactly as this power increases, and allows for the elasticity of the material, until at last it ends in a curve of great abruptness; and the result of the whole is that fine swell at the base which is calculated not only to please the eye in the highest degree, but to secure the greatest amount of strength by the expenditure of the least amount of material. The same principle, carried out by Smeaton, gave us the beautiful curve of the Eddystone Lighthouse—a structure which withstood the assaults of the fiercest storms. Other lighthouses, whose contours presented straight lines disappeared.

The same law holds good in regard to standards and pillars in machinery, and in regard to various parts of the framing. A few years since, it will be remembered, the frames of carding, roving, and spinning, frames were profuse in all kinds of curves and mouldings. There were circles, arches, ovals, beads, ovolos, and cavettos, cymarectas and ogees, fillets and slabs *ad infinitum* and *ad nauseam*. Even in machinists' tools and engines this architectural style prevailed in a profusion of Gothic arches and columns. To-day our best machinery is seen having only plane and curved surfaces in happy combination, and few, if any, of the small orchitectural mouldings. The old ornamental style has given way to higher and better taste, and whether we examine machinists' tools, or the best class of engines, or even general machinery, we cannot but note the improvement—which consists in having elegance without sacrifice of strength. We are aware that there are varieties of taste and opinions among machine-makers. Some will advocate and adopt straight lines and fillets as inexpensive—easier to mould and forge; others will pay much regard to symmetry and pleasing appearance; others, again, will not care about forms so long as the machine does its work. Hence, we find great diversity of forms more or less pleasing to the eye, and some without attractions.

Elliptical and parabolic curves can be introduced into frames and pedestals without any detraction of strength; on the contrary, strength and stability and symmetry can be most easily secured. Columns need not be parallel, but look better and are stronger made on true architectural principles. In figures or forms we are guided by certain rules in our judgment of the beautiful. In Nature we nowhere find squares or rectangles; seldom, indeed, right lines. Curved and winding are all her outlines, so that these simpler forms may be said to be man's own invention, growing out of his necessities. Yet these forms are beautiful in places for which they seem especially adapted. And here the idea of fitness becomes an element of beauty, that of proportion being united with it.

MINING AND METALLURGICAL PATENTS.

Supplied by Mr. ERNEST DE PASS, of Fleet-street, E.C., Fellow of the Institute of Patent Agents.

Amongst recent applications for patents, in which the readers of the *Mining Journal* are more immediately interested, are the following:—

W. H. Jones and B. Jones, Wolverhampton, No. 15,676, Metallic Boxes.—M. Clark, London, No. 15,686, Permanent way of light railways.—J. D. Bella, T. Chaloner, and W. Chaloner, London, No. 15,694, Instrument or apparatus for indicating the presence of gas, more particularly applicable for use in coal mines.—H. Knight, Liverpool, No. 15,719, Manufacture of sulphide of zinc or of pigments having sulphide of zinc as a constituent or ingredient.—J. Whiteley, Leeds, No. 15,728, Pipe founding.—T. C. Horsfall, S. H. Rickham, and W. Houldsworth, Manchester, No. 15,732, Apparatus for straightening wire.—J. Robertson, London, No. 15,752, Manufacture of metal tubes.—J. A. M'Kean, London, No. 15,775, Machines for boring and tunnelling rocks, stone, and minerals.—W. H. Bolton, A. Evans, and T. Bright, Cinderford, No. 15,783, Cleaning tin and terne or other plates by machinery.—J. S. M'Dougall, London, No. 15,800, Coating boilers made of copper or of copper alloys with lead.

The following selected specifications have been recently published, and are now open to inspection and opposition:—

MANUFACTURE OF METAL TUBES.—E. Deeley, Walsall, No. 297.—Tubes of any required section are made from a coil of strip heated and rolled into tubes at one heat.

GRATE-BARS FOR STEAM BOILERS AND OTHER FURNACES.—J. Stephenson and W. Topham, Bradford, No. 312.—Refers to improvements in the grate-bars described in letters patent No. 319, of 1871. Longitudinal bars are cast in one piece, with connecting cross-bars having air spaces between them.

APPARATUS FOR WASHING AND DRYING COAL AND OTHER SUBSTANCES.—C. E. Hall, Sheffield, No. 677.—The coal is fed through a hopper into a washing tank or trough, to which water is alternately delivered and withdrawn therefrom by a pump, the suction of the pump also partially drying the coal.

MOULDS FOR PIPES, COLUMNS, AND SIMILAR CASTINGS.—W. Whitfield, Gateshead, No. 708.—With a view to dispensing in a great measure with manual labour the sand is pressed down by a sliding frame operated by a motor through screws and gearing.

COILING WIRE.—J. H. Cairns, Markethill, Ireland, No. 829.—Refers to apparatus consisting of a mandrel turning horizontally, and two coiling drums set at an angle thereto, the wire to be coiled passing over the drums on to the mandrel.

MINING WEDGES OR TOOLS FOR BREAKING UP COAL OR OTHER MINERAL.—C. Burnett, Hartlepool, No. 1351.—The mineral is forced outwards by the action of a jambing bar, which presses through friction rollers against two parallel bars inserted in a bore-hole.

PROCESS OF MAKING MALLEABLE FERRO-NICKEL AND FERRO-COBALT AND COMBINATIONS OF THESE ALLOYS.—A. M. Clark, London (communicated by the Scciété Anonyme dite Fonderie de Nickel et Metaux Blancs, Paris), No. 2573.—By the direct employment of matts of these metals, which are combined at one and the same fusion with ferro-cyanide or cyanide of potassium and one of the oxides of manganese, adding at the moment of running a small quantity of aluminium.

BENDING RODS, BARS, SHEETS, AND OTHER FORMS OF METAL.—R. Storey, Darlington, No. 1635.—Refers to a particular method of giving motion to the rolls of bending machines by a worm and one or more worm wheels.

WORKING TRAMWAYS BY STEAM.

In treating of the working of tramways by steam in a paper read before the Institution of Civil Engineers, on Tuesday (Sir J. W. Bazalgette, C.B., President, in the chair), the Hon. RICHARD CLERE PARSONS, B.A., B.C.E., Dubl., M. Inst.C.E., stated that very little success had attended the various efforts made from time to time to work passenger traffic with engines on ordinary macadamised roads. He then proceeded to discuss the reasons why these efforts were not successful, and showed that the special privileges accorded to tramway companies by Act of Parliament had enabled steam to be used with advantage for the conveyance of passenger traffic along the streets of towns. The Board of Trade regulations were explained, and the manner in which they had of late been modified so as not to impose unreasonable hindrances to the use of steam, and at the same time to protect the public from danger. The author next described in detail the construction of the type of tramway engines which he considered to be most suitable to the requirements of street traffic. The cylinders were placed as high as possible, to be raised out of the mud, and were readily accessible from the front, to permit of the cylinder cover and pistons being easily removed. The connecting rods worked directly on to the cranks on the trailing axle, and the four wheels were coupled as in ordinary locomotives. He stated that many such engines had been constructed by Messrs. Kitson and Co., of Leeds, and were working satisfactorily in this country and abroad.

Various methods for rendering the exhaust steam invisible were referred to, and it was shown that surface-condensation was more satisfactory and more economical than super-heating. Atmospheric condensers were described as of great value where water was expensive, and it was stated that considerable economy could be effected by their use. The construction of the brakes fitted to tramway engines was of considerable importance, as the safety of the public to a great extent depended upon their being both quick and powerful in action. Sand-boxes should also be provided so as to sand the rails both in front and rear of the engine, and they should not be liable to become choked. On some tramways, especially abroad, the tramway engine and car had been combined, and amongst the best of this type was that designed by Mr. W. R. Rowan. The passenger car was supported upon two four-wheeled bogies. The engine acted as the leading bogie, which supported one-half of the carriage when empty; and when loaded a large portion of the weight of the passengers was available to increase the adhesion of the engine wheels on the rails. The engine could be detached from the car in five minutes, and a fresh engine substituted in about the same time.

The character of the permanent way where steam was to be used might be considered as only second in importance to that of the construction of the engine. At first it was too light, and difficulties were experienced in fitting the joints of the rails. It was contended that the line should be substantially laid, so as to avoid as much as possible frequent repairs, which were of a costly nature. In some localities this was especially necessary, as the wear and tear of the ordinary cart traffic, which generally made use of the tramway lines, were very heavy. Having explained in detail the construction both of a tramway engine and of a tramway, with a view to economy in working, the author proceeded to discuss what were the necessary expenses on an average line. As the result of experience, where a frequent service was maintained, the cost of working the engines, including wages, fuel, oil, and repairs, was 2·28d. per mile run. The question of depreciation, both of the rolling stock and of the permanent way, was next discussed, and it was held that, both for the engine and the cars, an annual allowance for depreciation at the rate of 10 per cent. would be sufficient, provided the ordinary repairs were paid for out of revenue. The depreciation on the line was taken at the rate of 3 per cent. per annum, which was laid aside to form a sinking fund, interest upon which was allowed to accumulate at the rate of 5 per cent., and in this way the cost of the line would be paid off in about 20 years. As the result of these computations, the total working expenses of a line, including all items of expenditure, which were given in detail, amounted to 9·33d. per mile run. As a practical rule, every surplus 1d. per mile run above the working expenses would give 2·2 per cent. dividend to the shareholders. The author concluded by advocating the use of large cars and moderate fares as the best means of securing the largest receipts, and consequently of ensuring good dividends to the shareholders.

In a paper on the Sydney Steam Tramways, Mr. WALTER SHELLSHEAR, Assoc. M.Inst.C.E., observed that the system of steam-tramways in operation in the city of Sydney was, perhaps, the most advanced in the world. When it was decided to hold an International Exhibition in Sydney, in 1879, a Bill was passed through Parliament empowering the Government to construct a tramway from the railway terminus at Redfern to within a few yards of the Exhibition gates. It was resolved to adopt steam as the motive-power, and four Baldwin 12-ton tramway motors were ordered from Philadelphia, U.S., and eight bogie double-decked cars, seated for 90 passengers. The permanent way was constructed on the longitudinal principle. This line was one mile 45 chains in length, and its cost, including rolling stock, was 22,269*l*. The convenience of the system was so highly appreciated by the public that in a few months the construction of 15 lines had been authorised by the local Legislature. The author then traced the growth of the system, and stated that at the end of 1882 a length of 22 miles were open, and that the capital expended, including rolling stock, machinery, and workshops, amounted to 412,561*l*. The number of passengers in that year reached 15,269,100, equal to 986,400 per mile, and the earnings amounted to 8142*l*. per mile. The lines were laid to a gauge of 4 ft. 8½ in. Difficulty was first experienced with the permanent way from the rails being of insufficient strength to support the weight of the motors. The rails were of inferior quality, having been re-rolled from old railway metals. The tramways were now laid on a cross-sleeper road, with steel rails of the Vignoles type. The sleepers were rectangular, laid on a 4-in. bed of Portland cement concrete. The roadway was formed of tarred bluestone. Where the street traffic was light the tarred bluestone roadway answered fairly well; but with heavy street traffic much difficulty was experienced in keeping the roadway up to the rail level.

The author then described the rolling-stock. Besides the Baldwin motors from Philadelphia, two engines had been supplied by Messrs. Kitson and Co., of Leeds, and one engine by Messrs. Merryweather and Sons, of London. The Baldwin motors were saddle-tank locomotives, enclosed by cabs concealing the boilers and most of the machinery. No attempt had been made at condensing, but the engines were fitted with a chamber into which the exhaust steam passed, muffling the noise. Four different sizes of these engines were at work. The cylinders were horizontal, and, the working parts being well balanced they travelled with remarkable smoothness. The motors had much to recommend them; but the wear and tear on the dusty and sandy roads were by no means a small item of maintenance. Fifty-seven motors were in use in October, 1883. The Kitson motors were originally fitted with a system of condensing tubes; but these had

been removed, as the steaming power of the boiler was thereby much reduced. The cylinders of the Kitson engines were inclined at a considerable angle, and the gearing being somewhat heavy they did not run so smoothly as the Baldwin motors. The Government were having some experimental steam cars constructed in Philadelphia, in which an ordinary tramcar and motor were combined. All the cars were built on the American bogie principle. They were mostly double-decked, with a roof over the upper deck; the lower deck was divided into compartments, with ten seats in each compartment. The rolling stock was fitted with vacuum brakes, as well as with powerful hand brakes. Of the stock of 81 cars and 5 bogie trucks at the end of 1882 all but 8 cars had been manufactured by local firms. Extensive workshops had been erected, including a tramcar shed and a motor running-shed, each 300 ft. long.

Some idea of the magnitude of the service might be afforded from the fact that along one street in Sydney 973 trams passed daily, and on public holidays this number was considerably exceeded. The author contended that, for steam tramways, the greatest attention was necessary in the design of the permanent way; that a substantial rail, thoroughly well supported, was essential to economy, and that it was advisable to have the streets well paved in order to reduce the amount of grit on the road, and thus diminish the wear and tear of the locomotives. The satisfactory results achieved on the Sydney tramways seem to show that horse-traction must yield to mechanical power. In an appendix the author gave a tabular statement of the gross earnings, the working expenditure, and the net earnings of all the lines in operation during the years 1880 to 1882 inclusive.

THE TIN MINES OF CORNWALL.

In an interesting lecture under this title, delivered before the Menai Society, Mr. F. W. WAIT, M.A., remarked that the original name of Cornwall appeared to have been in the British language Cernyw, signifying a "horn" or "promontory," given, no doubt, to the country on account of its cornucopical shape. This name was changed by the Romans into the Latin, Cornubia. The Saxons, however, after they had driven the Britons into the west coasts of Britain, called the inhabitants "Wealhas" or "foreigners," and the country "Wallia." The Romans finally changed Cornubia into Cornwallia, a name which not only expressed the shape of the country, but also that its inhabitants were of the same nation and descent as the Welsh. Afterwards Cornwallia and that part of Devon inhabited by the Danmonii, the Saxons called "West Wales," whilst the Romans embraced Cornwall, Devon and part of Somerset, under the name of "Britannia Prima." The information respecting the working of the Cornish mines at the commencement was very scanty, and there was nothing authentic till after the Roman conquest. Tin had from the remotest ages been carried from Cornwall to all parts of the civilised world. The purple of Tyre and the bronze of Nineveh and Babylon were, in all probability, indebted to the tin sent from there. According to Herodotus, the Phœnicians or Carthaginians obtained it from the "Cassiterides" or tin islands, which are supposed to have been Cornwall and the Scilly Isles, but they considered their commerce in the metal of such importance that they concealed the actual situation of the land whence it was obtained. It was uncertain whether their traders actually visited Cornwall, or whether they obtained their supplies through Gaul. The lecturer traced the history of the Cornish mines down to the reign of Edward III., who, he said, created the Stannary Courts (Lat. Stannum, tin), which formed a separate jurisdiction for the mining trade, and comprehended everything but land, life, or limb. Henry VII. confirmed what were called "the ancient privileges of the miners," and granted "that no new laws affecting the miners should be enacted by the duke and his council without the consent of 24 persons called Stannators, six being chosen of each of the four Stannaries." These Stannators were chosen by the Mayor and Corporation of the chief town in each district.

The principal mines at present in the course of working are situated in the neighbourhood and the westward of Redruth, from which place as far as the Land's End they extend along the northern coast embracing a breadth of about seven miles. The once celebrated Botallack, near St. Just, which runs under the sea has been worked out. In 1865, when the Prince and Princess of Wales descended the mine the main shaft ran out two-thirds of a mile under the sea, and 245 fms. down. In some places the sea is but 3 fms. over the back of the workings, so that the miner could hear the ebb and flow of the waves overhead. One year this mine was so rich that it yielded 50,000*l.* profit. In Dolcoath, the largest mine now in existence, the workings had been carried to a depth of 400 fathoms, and the profit is now 35,000*l.* a year, despite the present low price of tin, which is about 60*l.* a ton. Copper also was known at an early age to be the produce of this county, but it was then obtained from mines more especially worked for tin, but it was not till the end of the 17th century that mines were worked especially for copper. Nearly all the other metals were found in Cornwall, but not to any extent in comparison with tin and copper. A few mines in lead and silver-lead have been profitably worked, and the other metals are generally obtained from the tin and copper mines. The slate quarries at Delabole are vast and productive. In 1750 the china-clay stone was discovered, and is now raised and sent to the Staffordshire potteries. Diamonds, too, were found in Cornwall, and these were the finest specimens of clear transparent quartz found in Great Britain. The great metalliferous country extends from Dartmoor, in Devonshire, on the east, to the Land's End on the west, and belongs to the Devonian or grauwacke series of rocks, consisting of slates and shales. It has been generally asserted that the metals are found in veins or fissures of the rocks called "lodes," many lesser veins branching from the lode and terminating in threads; but Dr. Le Neve Foster, in a paper before the British Association at Montreal this year, stated that although this is often the case, there are many exceptions in the English Lake district, the Tyrol, Nova Scotia, and Australia, where the metals are found in "tabular masses of altered granite adjacent to fissures."

Tin, Mr. Wait explained, was nowhere found native or in a state of approximate purity; it occurred sometimes collected and fixed, and at others loose and dilated. In its fixed state it was either found in a horizontal layer of earth or interspersed in grains or small masses in the natural rock, which was generally granite or slate. In its dispersed from it was found either in a pulverised state in stones called "shades," or in a continued course of shades called a "stream." Copper was generally found in granite only, and the most encouraging sign of a rich ore of copper was the gossan, an earthy ochreus stone of a red colour, which crumbled like the rust of iron. The copper pyrites, or bisulphuret of copper, and the peroxide of tin were the chief ores which were found. Dealing with his third point—the formation of a mine, Mr. Wait asked his audience to suppose that a "lode" or vein of quartz with metal in it, had been discovered cropping out of the earth. The ground was critically examined; and if the prospect was good, a company was started, shares issued, and certain officers and captains appointed. The latter were experienced miners, who "knawed tin," as the Cornish expression was, and their business was to superintend the mines, and investigate the geological value and prospects of the workings. The miners set to work, and dug out the lode (say) to the depth of 200 or 300 ft., and the shaft was thus made of about 9 ft. by 6 ft., which might slope much, little, or not at all, according to the lie of the lode, for, whatever course the lode took the miner always followed suit. To get rid of the water, which often impeded the miner's work, an engine-house was erected, with the necessary gear to keep the works dry. If the mine was started near the coast, from a little above the sea level, or if the mine was inland, from the bottom of a neighbouring valley, a horizontal tunnel, about 7 ft. by 3 ft., was driven inland to meet the shaft, so that there might be an easy and inexpensive passage for the water without pumping. This was called an adit level. As the shaft was sunk further into the ground another level, at a distance of (say) 20 fms. or more, is made below the former. The water in this is pumped to the upper level, and so escapes. Thus down the miner went, sinking his shaft and driving his levels. The air naturally became bad from want of circulation and fumes from the blasting. When the levels were driven a considerable distance from the shaft, to create a circulation of air, holes or shafts, called winzes, were sunk at intervals from the upper to the lower levels.

The Cornish miner did not suffer so much from violent death as his fellow-men in the coal mines, but he had been exposed to the dangers of being drowned "Like a rat in a hole," as occurred some years ago in Botallack in the process of tapping the water from the workings and the part of the mine which had not been worked for years. Great care was necessary in such operations, as also in blasting the rocks. There were, however, no dangers from fire-damp. With regard to the driving levels there had been great strides made within the past few years in shortening labour and gaining time by the use of boring machines, driven by compressed air, and dynamite was used for removing the rock. By means of boring machines many mines have been kept working that without them would have ceased operations, as in the case of poor mines having promising points at a distance from the then workings. It has been found possible to drive in a few months what would have taken years to accomplish by hand labour, and by the latter method would never have been attempted. By means of Capt. Teague's patent ventilator (which the lecturer explained by a diagram) much longer distances can be driven in levels before sinking winzes. A most interesting account was then given by the lecturer of the progress of a mass of tin, after which he directed attention to the miners who were divided into three classes. First, there were the dressers who worked on the surface dressing ore, &c., and who are paid a weekly wage. They consisted chiefly of women and children, the former receiving about 18s. a month, and the latter from 10s. to 16s., according to age and capacity. The second class were the tutmen, otherwise "piece-work men,' and their duty was to hew, bore, and blast the rock at so much per fathom, being employed at driving levels and working the boring-machines. Their remuneration was from 3*l.* 10s. to 4*l.* a month. The third class were the "tributers," who experienced all the excitement and uncertainty, and were always hopeful of becoming rich. The portion of ground on which he agreed to work for a month was called his "pitch," and his rate of pay was determined beforehand by the prospects of the pitch, which, after all, might turn out so poor that he might absolutely receive nothing for his month's toil, and was compelled to ask for "subsist," which was enough money to help him to live during the next month, while at another time he might make 100*l.* to 200*l.* in the same period.

Speaking generally of the Cornish miners, the lecturer described them as an intelligent, independent set of men, possessed with much endurance and perseverance in their work underground, which taxed their muscular powers as well as their patience to the utmost. Not long ago there were 28,000 employed in the mines, but owing to a variety of circumstances many had been compelled to emigrate, but wherever they went they were always in demand. The miner's working suit was very simple, and often very ragged. It consisted of a suit of flannel and a hat of thick felt in the shape of a wide-awake, and stiff enough to guard the head against hard knocks. Clumsy ankle boots completed the costume. Taking with him blasting fuse, several iron tools, a small canteen of water, and a bunch of tallow candles, which latter he fastens to the button hole of his coat, he proceeded to the square hole in the ground, out of which protruded the head of a ladder. Here he lighted one of the candles, and fastened it to the front of his hat by means of a lump of clay. The shaft down which he descended was generally about 6 ft. 9 in. wide, and in a mine such as Botallack 300 fathoms deep; the time taken was over half-an-hour to descend, and an hour to ascend. In the principal mines, in order to save as much extra labour as possible, the man-engine was employed for carrying the men to and from their work, and at present there were five of these in the country. Having explained this description of machine and illustrated it by diagrams, Mr. Wait said that the miner on arriving at last at his pitch 'commenced his work, which, owing to its stubborn nature, kept him in a perpetual state of perspiration. He generally remained in the mine, which was sadly deficient in oxygen, and was much vitiated by the fumes of smoke, eight hours. It required no ordinary constitution to withstand the fatigue to which he was exposed. Upon emerging from the mouth of the mine the workman changed his underground clothing at a "moor house," which was generally built near the shaft.

The miner's working life was a short one, and comparatively few of those who began it lived to a healthy old age. The climate of Cornwall was extremely damp, but except to persons of consumptive habits it was highly salubrious, and the inhabitants were in general healthy and remarkable longevity. In 1862 a Royal Commission made a full and exhaustive enquiry into the health of the miners. It was found that the excessive death-rate of the Cornish miners was entirely attributed to diseases of the lungs, but in respect of other diseases he was more free than the rest of the population. Between 1860-62 the death-rate from lung diseases was as follows: From the ages of 15 to 75, for males in England, 26·8 per cent.; for the Cornish miner, 54·76; and for non-mining males in Cornwall, 26·38. This showed that the Cornish miner underground suffered twice as much as his fellows on the surface. Fortunately of late years the man-engines, boring machinery, and the patent ventilator had done much towards lessening the causes of this disease, and the high temperature was much lessened by the free discharge of the compressed air from the boring-machines. The sons of miners attended their fathers to the mines at an early age, and were proud when considered strong enough to work, while their daughters became bal-maidens (mine maidens), and assisted in dressing the ore on the surface.

The Cornish miners were a very religiously minded class, and Sunday was to them indeed a day of rest. For the most part they were Wesleyans, and some of the miners became local preachers, and a few of them had eminent capabilities. Touching on the Cornish language, Mr. Wait said it died out in the end of the 18th century; but words and phrases remained, and the pronunciation of English had its distinctive tone, which was of a hearty and pleasing nature. One striking peculiarity amongst the people was the appellation of "my son" and "my dear;" and the transposition of the subjective and objective personal pronouns was very noticeable, not only in Cornwall but in parts of Devon and Somerset. For instance, "Her will do ut, ef her can," or again, "Us ca'ant go without she." The lecturer concluded by speaking of Cornwall generally, remarking that it was a county possessed of great interest for the tourist and archæologist, abounding in cromlechs, carns, circles, &c., there was much to mark the former presence of Druids, Britons, and Danes.

THE ELECTRIC LIGHTING OF RAILWAY CARRIAGES.—An entire electric light installation is being fitted up by Messrs. Heenan and Fronde, of Manchester, for the Great Eastern Railway Company for lighting up their railway carriages. At present there are seven trains in full running order, and these have been running since Oct. 1 without a hitch. The dynamos are driven by Messrs. Heenan and Fronde's high speed spherical "Tower" engines, which attracted so much attention at the late Engineering and Metal Trades Exhibition in London. The engine and dynamo is 3 ft. 3 in. long over all, by 13 in. wide, and 2 ft. high. This is placed on the boiler of the locomotive in the rear of the dome, and is clear of the side view of the driver, as it occupies a centre position on the boiler. Steam is taken from the dome and exhausts by the funnel. The dynamo used is that made by R. E. Crompton. The engine, which developes 10-horse power, and runs 1000 revolutions per minute, weighs only 57 lbs., and the dynamo, engine, and bed complete, and coupled ready for work, weigh 3½ cwts. The wires and lamps are so arranged as not to interfere with oil lamps being put in at a moment's notice in the event of a train being divided from the main to a branch line. We understand the Great Eastern Railway are so satisfied with the result of the experiments that they contemplate applying the electric light to the whole of their trains.

LEAD.—The Lead Warrant Company's latest circular states that their charges are only 2s. 6d. per ton in all for the landing and delivery of lead, and 4d. per ton per month rent—special terms being offered to brokers and agents, as well as to lead producers dealing direct. At the end of the year stocks of lead will, it is thought, most likely be greatly increased.

IMPORTANT GOVERNMENT ENQUIRY INTO THE COAL TRADE AND QUAY ACCOMMODATION OF DUBLIN.

An enquiry at the Priory Council Chamber, Dublin Castle, into certain new bye-laws proposed to be introduced by the Port and Docks Board for the regulation of the coal and other traffic on the quays at Dublin, and the shipping frequenting this port, was concluded on Saturday before Mr. T. PIERS F. WHITE, Q.C., the Commissioner appointed by the Lord Lieutenant.

The new bye-laws require under the Act of Parliament the sanction of the Lord Lieutenant in Council in order to give them legal validity, and notices of objection having been received from parties affected thereby, His Excellency appointed Mr. White Commissioner for the purpose of enquiring into the advisability of the proposed bye-laws, and advising thereon.

The following counsel appeared:—Messrs. Monroe, Q.C., and Robertson for the Port and Docks Board; Dr. Boyd, Q.C., on behalf of the London and North-Western Railway Company; Messrs. Holmes, Q.C., and Overend for Mr. R. Cochrane; Messrs. Wallace Brothers and several other parties who objected to certain of the proposed regulations; Mr. Gibson, Q.C., for certain owners of house property who sought modifications in some of the bye-laws; and Messrs. Holmes, Q.C., and Adams for Mr. Cotton, on behalf of the Alliance and Consumers' Gas Company, who objected to one of the bye-laws affecting the landing of coal on the quays.

Mr. HOLMES, Q.C., said he appeared not only for the gas company, but also on behalf of several other large importers of coal, and shipowners, including Messrs. M'Cormick, Carroll, Wallace, and Nicholl, to object to the proposed bye-law with reference to the landing of coal on the quays. The present bye-law was that—"Coals that shall be landed on the quays shall not be stacked or heaped there unless with the written permission of the harbour or dock-master." This was the existing law, and under it his clients contended the public had every reasonable protection against obstruction, the rule hitherto being that the coal, after being disembarked on the quays, should be removed within 48 hours after landing. Instead of this the Port and Docks Board now proposed to substitute a bye-law to the following effect:—"Coals shall not be landed on the quays in bulk, nor stored or heaped there, unless with the written permission of the harbour and dock-master." The effect of this regulation would be to prohibit the landing of coal at all on the quays. The difference might appear small at first, but the effect would be very serious, as coal was uniformly landed in bulk, and to prohibit it would cripple the trade, and greatly increase the price of coal to the public. One of the clients for whom he appeared—the Alliance Gas Company—imported 100,000 tons of coal in the year, so that the change would vitally affect them. He believed that this new regulation was the outcome of an agitation got up by certain owners of houses on the quay, who complained of the alleged inconvenience caused by coal dust, and they had agitated the matter before the Corporation. He submitted that this inconvenience would be entirely remedied if a suggestion already made by the coal importers were adopted—that of erecting sheds under which the coal would be stacked, which would prevent the dust from giving any annoyance. This proposition had already been made by the coal importers, who offered to contribute to the expense, but for some reason or other, the Port and Docks Board had declined the suggestion.

Mr. WHITE: Do the gas company stack coal on the quay opposite their premises?—Mr. HOLMES said the coal was landed there, but it was always removed as speedily as possible, and, as a rule, it never remained 48 hours.

Mr. GIBSON, Q.C., said he appeared on behalf of the owners of houses on the quays who complained of the great nuisance occasioned by immense stacks of coal being heaped on the quays—to the inconvenience of the public, and the deteriorating of property on the quay—for days and weeks together. Such a thing was not permitted in any part of the world except in Dublin. The quays were taken possession of and blocked up, and the nuisance of coal dust was such as to render their habitations intolerable, and the value of property along the quays was decreasing every day. His clients objected to the former bye-law, and supported the one now proposed, the only alteration he would suggest being that the thing should be prohibited altogether, and that the harbour and dock-master ought not to be given any power of permitting it. With regard to the suggestion of erecting sheds under which the coal would be stacked, that would, no doubt, remove some part of the evil complained of, but it would be objectionable as perpetuating the monopoly of the quays by private individuals.

Mr. WHITE: Do your clients, besides objecting to it on the ground you have mentioned, object to it on the ground of being injurious to health?

Mr. GIBSON: Certainly; they had complained of it to the Corporation as the sanitary authority.

Mr. ROBERTSON read a letter from Mr Cameron, the Medical Officer of Health, giving his opinion that the coal dust was injurious and unsanitary. The one objection the Port and Docks Board saw to the erection of sheds was that the width of the quays was not sufficient to permit of being encroached on to the extent that would be done if sheds were put up.

On Saturday, Capt. CARPENTER, R.N., Harbour Master, examined in reference to the proposed bye-law forbidding the landing of coal in bulk, said the Port and Docks Board had agreed to recommend that bye-law for adoption by the Lord Lieutenant, after very careful consideration, in consequence of representations made by the owners of house property along the quays, who complained of the nuisance occasioned by large heaps of coal being stacked on the quays. Coal was at present allowed to be stacked on the quay, the only restriction being that it should be removed as quickly as possible; and witness had always endeavoured to regulate the traffic in such a way as, while facilitating the trade, to occasion the maximum of benefit with the minimum of inconvenience to the public. He did not approve of the suggestion made for the erection of a number of sheds along the quays for the purpose of stacking the coal. He believed the sheds to be of any use should be of such size as not to seriously restrict the already limited width of the quays, and should be about 25 ft. in height, which would permanently block up the houses and make them almost uninhabitable. He had himself suggested a comprehensive plan, which he hoped sooner or later to see carried out, that the Port and Docks Board should purchase up all the property on the quay from Lime-street right up to Duke-street or Butt Bridge, and throw the houses down, thus acquiring space which would enable them to widen the quay and build coal yards which they could let to the coal merchants who should then be obliged to unload the coal direct into yards, for which they could have tramways and all other appliances. There would be then no more nuisance or inconvenience to the public, and the trade would be accommodated.

Mr. MURPHY (of Messrs. Palgrave and Co.), as a member of the Port and Docks Board, was examined in support of the proposed bye-law.

Mr. J. J. CARROLL, Mr. S. S. M'CORMICK, and Mr. H. WALLACE were examined in support of the case of the steam coal importers against the proposed bye-law. They agreed in stating that it would be impracticable to carry on the trade if they were prohibited from landing coal in bulk. In reply to Mr. WHITE, as to whether it could not be taken out of the steam-vessels, thrown into wagons, and carted to the stores by tram-carts, they stated the inconvenience to the inhabitants of the quays would be as great, if not greater, than the present plan; while, owing to the difficulty of procuring storage accommodation, the trade would be crippled and the steamers delayed, resulting in the price of coal being increased to the public probably 1s. or 1s. 6d. per ton. They admitted that the present storage of coal on the quays was an inconvenience to residents there, but concurred that it would be almost entirely remedied by erecting sheds; and they stated they could erect them at their own cost, if permitted to do so, and would pay a reasonable rent to the harbour authorities for the accommodation. They also stated that the Custom House Docks were not available, the space being already occupied, and the Spencer Docks were too limited in length to accommodate steamers of the size used by the trade.

On behalf of the gas company, their chief engineer, Mr. WATERFIELD, said that there was no inconvenience occasioned by the stacking of coal by them, as there were no inhabited houses on the part of the quay they used, it being practically only opposite their own premises. The proposed bye-law, if it were enforced as against the gas company, would be a serious injury to them, and a great public inconvenience, enhancing the price of gas.

Mr. NOLAN (Sir John Rogerson's quay), Mr. W. W. ROBINSON (an importer of coal by sailing vessels), and Mr. F. MURPHY (City quay), were examined in support of the proposed bye-law, and described the inconvenience and injury complained of by the residents as arising from the quantities of coal stacked on the quays, blocking up the traffic, and filling the houses with coal dust, to the deterioration of property in the vicinity. In their opinion the suggestion as to sheds would not meet the difficulty, as the dust would still incommode the inhabitants, and the nuisance would not be materially diminished.

Mr. ROBINSON stated that he did not believe the introduction of steam importation had benefited the public in any degree, and, as a sailing vessel importer, he complained that he and other merchants similary situated were unfairly handicapped by being refused the permission to use the quays in the same manner as was done by the owners of steam colliers.

Mr. INGLIS (steam coal importer), as a member of the Port and Docks Board, and a lessee of portion of the Custom House Docks, repudiated the suggestion that his being a member of the Board gave him any unfair advantage over other traders. For the accommodation he had he paid a rent of 1*l.* per foot per annum.

Mr. HOLMES, Q.C., on behalf of the general body of importers, said that the berths in the docks ought to be submitted to public competition, and let to the highest bidder.

Capt. DENT, R.N., of the London and North-Western Railway Company, was examined in reference to a condition of the proposed regulations affecting the navigation of the channel, and the obligation to keep to the proper side of the fairway.

This having concluded the evidence, Mr. WHITE, Q.C., said he would carefully consider the various suggestions presented to him, and the evidence given, without delay, and report thereon to the Lord-Lieutenant.

The enquiry then terminated.

OOREGUM GOLD MINING COMPANY.—At an extraordinary general meeting held at the offices of Messrs. Cooper Bros., and Co., George-street, on Tuesday (Mr. Arthur Cooper in the chair), the Chairman explained the object of the meeting, and moved the confirmation of the special resolution unanimously passed at the meeting on Nov. 14:—"That the liquidator be and is hereby authorised to sell and transfer all the estate and effects of the said company to a company proposed to be formed and registered with Limited Liability under the style and title of the Ooregum United Gold Company (Limited), with a capital of 50,000*l.*, in 50,000 shares of 1*l.* each, in consideration of the payment by such new company of such an amount as shall cover the debts and liabilities of this company, and the costs of and incident to its liquidation, and of 11,400*l.*, in 11,400 shares of 1*l.* each in the said proposed new company, each of such shares to be issued and credited in the capital and books"

such company as fully paid, to be allotted to the shareholders of this company in such proportion and to such persons entitled to the same as shall be directed by the liquidator in the proportion of one share in the new company for every 10 shares in the old company. Provided that as regards all holdings or portions of holdings in the old company comprising shares less in number than 10, one share in the new company be given in lieu and satisfaction of such holding or portions of holdings. And that the liquidator be and he is hereby authorised to execute and attach the seal of the company to any agreements, deeds, or documents which may be necessary or proper for giving effect to this resolution, and which may be approved by the company's solicitor." The resolution having been seconded and carried unanimously, the proceedings terminated.

ACTION OF COAL DUST IN CONNECTION WITH COLLIERY EXPLOSIONS.

The experiments made before the German Fire-damp Commission, on Oct. 3, at König Grube, near Neunkirchen, in the Saar Coal Field, belonging to the Prussian Government, and reported in the Rhenish Westphalian Glückauf, were brought before the Manchester Geological Society, at their recent meeting, by Mr. Martin, hon. secretary. A gallery has been constructed on the surface 51 metres in length, of elliptical form (5½ ft. × 4 ft.), with a cross gallery, to represent the actual state of a colliery level. There are windows placed at a distance of 1 metre apart for observation from the exterior. One end is closed by a massive piece of masonry, in which small cast-iron cannons are placed, with bores of the sizes usually used for blasting in mines. Fire-damp is conducted in pipes 1100 metres, from a blower in the mine to a gasometer on the surface, for the purpose of these experiments. The Government Inspector of Mines, Mr. Margarf, has made some 200 experiments, and is continuing his observations.

The following are the experiments referred to as having been made on Oct. 3, in which the shots were charged with ½ lb. of powder, and fired by electricity:—1. Stemmed with clay the length of flame was 3 metres.—2. Stemmed with coal dust the length of flame was 8 metres. In these experiments neither coal dust or fire-damp was present in the gallery.—3. Stemmed with clay, the gallery being strewn 40 metres in length and 1½ in. thick with a very non-gaseous coal dust from Morsbach Colliery, near Aachen (Aix-la-Chapelle), the length of flame was 5½ metres.—4. Stemmed with coal dust and dust strewn in the gallery, as in No. 3, the flame was 9½ metres.—5. Stemmed with clay, the forenamed coal dust being replaced by dust from Pluto Colliery, in Westphalia, where the coking and gas seams are worked, the length of flame was 58 metres, or 7 metres beyond the end of the gallery, accompanied by a strong detonation and development of a very heavy after-damp.—6. A repetition of No. 5, without fresh dust being added, gave almost identical results.—7. Stemmed with clay, and fired without the presence of coal dust in a chamber of 20 cubic metres content, filled with a well-diffused mixture of fire-damp and air in the proportion of 1 to 20—5 per cent. of fire-damp—the length of flame was about 11 metres.—8. Similar to No. 7, with the addition that 20 metres of the gallery was strewn with coal dust as before from Pluto Colliery, the length of flame was 52 metres, accompanied by an exceedingly severe detonation, and a strong development of thick heavy after-damp.

The extraordinary force of the explosions with Pluto coal dust may be judged of from the fact that No. 5 without the presence of fire-damp, but with 40 metres of dust, a colliery wagon weighing 6 cwts. placed at the mouth of the gallery was blown 7½ metres along the tram rails, rising with a gradient of 4°; and that No. 8, with 5 per cent. fire-damp but only 20 metres of the gallery strewn with dust, the wagon was propelled 12½ metres up the 4° gradient, and there thrown off the rails.

The President said they must all be very much obliged to Mr. Martin for his communication. The fact seemed well established that coal dust was a great contributor to the violence of colliery explosions, but as to how it acted there was some difference of opinion.

Mr. Mark Stirrup mentioned that enquires had been pursued in the same direction in this country by Mr. Galloway, who had stated the results of his experiments before the Royal Society in 1876. His experiments were pretty well known, but whether they were so complete as those undertaken in Prussia he (Mr. Stirrup) could not say. Members would find in the society's library various works bearing upon this subject. In the recent Transactions of the Chesterfield and Derbyshire Institute, vol. 10, 1882, there was, he knew, a long and interesting report of a committee of the Institute on this subject.

Mr. Martin said he had received a letter from Mr. Galloway stating that the experiments fully confirmed those he had himself made on a smaller scale.

Mr. Stirrup said that attention had also been drawn to this subject in America, from an explosion not of coal but of flour dust, which was attended with disastrous effects both to life and property. The explosion was communicated from one mill to another through the ignition of the dust of flour, and several buildings were destroyed. This seemed to show that the danger was not wholly confined to colliery dust.

Mr. Dickinson said he did not know that it was worth while his troubling the society with his views upon this subject, which were, he thought, well enough known. The subject really was not new; it was 30 years ago when he took part in an investigation into the circumstances attending an explosion at one of the Wigan collieries, where 89 lives were lost, that the presence of coal dust was alleged to be an aggravating cause of the explosion.

FOREIGN MINING AND METALLURGY.

Prices for various descriptions of iron have been drooping more and more in France, and a quotation of 5*l.* 12s. per ton for merchants' iron s now generally admitted. There are rumours as to great public works which are intended to be carried out at Paris; but in view of the rge productive resources of the ironworks and in view also of the uncertainty prevailing as to the date at which the new Parisian improvements will be commenced, they have not exerted much influence upon current business. The Chiers Company, in the Meurthe-et-Moselle, has just stopped one of its furnaces, and it is stated that two other furnaces will have to be blown out this month in the Longwy basin. It is announced that MM. Marrel Frères have just constructed a steam hammer of from 80 to 100 tons at their works. Hitherto Creusot and the Marine Steelworks were the only industrial establishments in France possessing tools of similar proportions. The Spanish Minister of Marine has just concluded a contract with the Société des Forges et Chantiers de la Méditerranée for the construction of an ironclad. The plates required for this ironclad will be supplied by the Creusot Works. The guns will be of a Spanish type. The ironclad is to be as powerful a vessel as the Duilio (Italian), the Duperré (French), or the Inflexible (English). The new Spanish ironclad is not to draw too much water to prevent her passing through the Suez Canal.

The Belgian Iron Trade continues to suffer generally from a scarcity of orders, and the weeks also glide on without any improvement in quotations. There has been no general fall in prices, and several establishments have maintained their rates with firmness because they have still orders on hand. These fortunate concerns become more and more rare, however, and those which have fewer orders on hand make little concessions in order to secure orders. English casting pig has scarcely made 2*l.* 2s. 6d. per ton, as hitherto in Belgium, and Athus has been obliged to reduce its price to 2*l.* per ton. Charleroi has been enabled to maintain a price of 2*l.* 14s. per ton for special works, but hard pig has declined to 1*l.* 17s. 6d. per ton; ordinary pig has also fallen to 1*l.* 15s. per ton, and mixed pig to 1*l.* 12s. per ton, which is scarcely higher than cost price. German spiegel pig has been offered at 2*l.* 10s. per ton at the works; this is equivalent to about 3*l.* per ton delivered. There is not much change to report in current quotations for Belgian iron. No. 1 has remained at 4*l.* 10s. per ton for exportation, but a quotation of 4*l.* 12s. per ton for home transactions has been a good deal discussed. No. 2 iron has made 4*l.* 16s. per ton, and No. 3, 5*l.* 2s. per ton. Girders have r ged between 4*l.* 16s. and 5*l.* per ton. No. 2 plates, which were selling two months since at 6*l.* 4s. per ton, can now be procured at 5*l.* 16s. per ton for exportation, and 6*l.* per ton on home account.

All descriptions of household coal have been maintained with firmness upon the Belgian markets, and some colliery owners in the Liége district have even advanced their prices. An interruption in navigation on the Rhine, in consequence of low water in that river, has tended, in some degree, to confirm the upward tendency in prices. Coal for metallurgical purposes is still, however, somewhat depressed. The movement of coal over the Belgian State Railways has continued to exhibit some contraction. Thus, the number of trucks carrying coal and coke which passed over the system in the week ending Nov. 23 was 21,478, as compared with 22,462 in the corresponding seven days of 1883. There has been no great firmness in the general tone of the German coal trade. The movement of coal over the railways accommodating the basin of the Ruhr has rather fallen off, having been only 81,540 tons per day in the first half of November, as compared with 83,440 tons per day in the second half of October. When we extend the comparison back, however, to the first half of November, 1883, we find that the daily average movement was then only 78,830 tons, or 2710 tons less per day than it has been of late. Coal quotations, although lacking firmness, have not, at the same time, shown much change in Germany. The most noticeable feature of the markets has been the fact that household coal, instead of rising as usual at this period of the year, has remained stationary.

THE TIN TRADE.

Messrs. De Monchy and Havelaar (Rotterdam, Nov. 29).—Our tin market has been firm during the greater part of the month now under review, and prices advanced ½fl. to ¾fl. Moderate shipments from the Straits, and the comparatively low prices now ruling, may be considered the principal reason for the firmness evinced by holders. Looking at statistics we see consumption exceeding supply by nearly 2000 tons during the 11 months since Jan. 1, and it is astonishing why speculators so little avail themselves of the favourable opportunity to operate on a larger scale. The Dutch Trading Company's last sale in 1334 took place on Nov. 27, when 22,506 slabs Banca were sold from 46 fl. to 46¾ fl.; average, 46¼ fl; 299 slabs Billiton were sold from 45¼fl. to 45½ fl. Next sale will be held towards the end of January, 1885. The turnover in Banca has been limited. From 46¼fl. we advanced to 47 fl. Since the sale there are buyers at 46¼fl. Billiton has been in fair demand, and with a regular business prices steadily advanced from 44½fl. to 45¼fl. for 14 days prompt. The last week buyers showed somewhat more reserve. Our present quotation is 45¼fl. for cash parcels, forward delivery commanding ½ fl. more. The next Batavia sale of 10,000 peculs will be held on Dec. 23.

The position of Banca tin in Holland on Nov. 28, according to the Official Returns of the Dutch Trading Company, was—

	1884.	1883.	1882.
Import in November ....Slabs	13,916	4,175	6,000
Total eleven months	119,116	147,339	138,477
Deliveries in November	7,400	8,921	11,700
Total eleven months	111,933	121,605	122,278
Stock second hand	45,232	41,278	41,203
Unsold Stock	81,959	89,920	61,161
Total stock	127,191	131,198	102,364
Afloat....Peculs	9,300	—	—
Statement of Billiton.			
Import in November ....Slabs	4,799	3,500	3,800
Total eleven months	76,432	94,590	108,242
Deliveries in November	6,532	9,660	7,099
Total eleven months	97,310	98,013	80,687
Stock	35,650	48,898	55,621
Afloat....Peculs	15,000	15,000	15,000
Quotation, Dec. 1—Banca	46¼ fl.	53½ fl.	59½ fl.
Billiton	45¼ fl.	52½ fl.	59 fl.

These combined returns of Banca and Billiton for 1884, compared with those for 1883, exhibit—An increase of the import for Nov. of 345 tons; a decrease of the import for the eleven months of 1449 tons; a decrease of the deliveries for Nov. of 145 tons; a decrease of the deliveries for the eleven months of 324 tons; a decrease of the stock second-hand of 290 tons; a decrease of the unsold stock of 249 tons; a decrease of the total stock of 539 tons; a decline of the quotation of Banca of 11*l.* 12s. per ton.

The Government Returns for the month of September are as follows:—

EXPORT OF TIN FROM HOLLAND.

	September.			Nine Months.		
	1884.	1883.	1882.	1884.	1883.	1882.
To Germany ....Tons	293	363	219	3732	2990	2550
England	2	30	1	406	108	66
Belgium	110	115	65	704	1157	714
France	24	46	15	280	288	290
Hamburg	24	85	23	324	315	371
The United States	33	37	3	288	303	70
Other countries	48	64	53	383	272	343
Total	534	730	379	6097	5413	4424

Messrs. Strauss and Co. (London, Nov. 30) issue the following Statistics of Tin:—

	Oct. 31, 1884.	Nov. 30, 1884.	Nov. 30, 1883.
Straits and Australian, spot ....Tons	3,998	4,146	3,995
,, ,, landing	430	557	851
Straits, afloat	1,850	1,415	1,710
Australian afloat	2,000	1,775	2,150
Banca, on warrants	941	1,413	1,290
Billiton, spot	1,168	1,114	1,659
,, afloat	1,121	943	878
Australian tin in Holland	—	—	—
Stocks in America, including quantity afloat	2,419	1,965	3,420
Total	13,918	13,328	15,953
Prices of Straits and Australian	£73 15	£74 15	£87 0
Deliveries during month in London	1,703	1,600	1,701
,, ,, Holland	778	405	533
Total	2,486	2,005	2,234

Shipments during the month from Straits to London, 850 tons; from Australia to London, 575 tons; from London and Holland to America, 275 tons; from Straits to America, 150 tons; from Australia to America, — tons. Banca in Trading Company's hands and afloat, 3145 tons.

THE COPPER TRADE.

Messrs. Henry R. Merton and Co. (Leadenhall-street, Nov. 30) issue the following Statistics of Copper:—

	1884.
Stocks in England and France and afloat thereto:—	
Chili bars, Liverpool and Swansea ....Tons	22,644
Chili ingots, Liverpool and Swansea	49
Chili ores and regulus, Liverpool and Swansea (fine)	720
Other stuff, Liverpool and Swansea (fine)	4,665
London, Foreign copper (chiefly Australian) and Landing	2,437
Havre and Bordeaux, Chilian and other bars	1,020
Havre and Bordeaux, other copper	830
Afloat from Chili (advised by mail and cable):	
Ores and regulus (fine)	2,954
Bars and ingots	6,291
Afloat from Australia (advised by mail and cable):—	
Fine copper	1,998
Total	43,518
Price of Chili bars, per ton	£51 5 0

Messrs. Harrington, Horan, and Co. (Liverpool, Nov. 29).—Chili copper charters for first half of November were advised on Nov. 17 as 1400 tons fine, of which 950 tons bars and ingots, 50 tons furnace material for England, 400 tons bars for orders here or Continent. The price of bars was 817·50, and exchange 30d. During the fortnight a weakness manifested itself in the Chili bar market, and a considerable business was done mostly in short prompts down to 50*l.* 5s., and three months 51*l.* With less offering, prices then advanced to 51*l.* spot, and 51*l.* 10s. forward, when a strong demand set in principally confined to one quarter, having the effect of driving prices up to 51*l.* 17s. 6d. spot, and 52*l.* 7s. 6d. forward. The market is since easier, and we close at 51*l.* 7s. 6d. and 52*l.* per ton respectively. On Nov. 27 English smelters reduced their price for manufactured copper 2*l.* per ton, making strong sheets now 63*l.*, and India sheets 61*l.* The following sales of furnace material have transpired:—At Liverpool 100 tons yellow Quebrada ore at 9s. 3d., and 6000 tons Rio Tinto regulus for delivery over 12 months at the rate of 500 tons per month on private terms.—At Swansea: 700 tons Cape ore at 10s. 3d., 300 tons Rio Tinto regulus on private terms, 500 tons at 9s., and 200 tons Carracedo ore at 9s. per unit.—Precipitate: 50 tons Mason's at 10s. 1½d., and 60 tons best Rio Tinto at 11s. 1½d. per unit. Import of Chili copper during the past fortnight, 871 tons fine, against 1030 tons fine same time last year; delivery, 540 tons fine, against 1033 tons fine same time last year; import of other copper during the past fortnight, 1514 tons fine, against 1576 tons fine same time last year; delivery, 1585 tons fine, against 1269 tons fine same time last year. The total imports of Chili and other copper into Liverpool and Swansea since Jan. 1 have been 66,750 tons; deliveries during the same period, 72,287 tons fine; for same time last year the figures were 60,364 and 56,053 tons respectively.

Arrivals here during the fortnight of West Coast S. A. produce:—Britannia, from Valparaiso, &c., 8 tons regulus, 300 tons bars, and 246 tons ingots.—At Swansea: Henry Bath, from Chanaral, 715 tons regulus. Stocks of copper (Chilian and Bolivian) in first and second hands, likely to be available, we estimate at—

	Ores.	Regulus.	Bars.	Ingots.	Barilla.
Liverpool	—	255	15,751	49	—
Swansea	—	1343	3,893	—	—
Total	—	1593	22,644	49	—

Representing about 23,413 tons fine copper, against 23,082 tons Nov. 14; against 27,720 tons Nov. 30, 1883; 23,521 tons Nov. 30, 1882; against 26,683 tons Nov. 30, 1881. Stock of copper contained in other foreign ore and Spanish precipitate, 4965 tons fine, against 3135 tons Nov. 30, 1883. Stock of Chili bars and ingots in Havre, 1125 tons fine, against 3179 tons Nov. 30, 1883. Stock of Coro Coro Barilla in Havre, 69 tons fine, against *nil* Nov. 30, 1883. Stock of copper other than Chili in Havre, 645 tons fine, against 420 tons Nov. 30, 1883. Stock of Chili copper afloat and chartered for to date, 9502 tons fine, against 10,244 tons Nov. 30, 1883. Stock of foreign copper in London, chiefly Australian, 26.0 tons fine, against 3517 tons Nov. 30, 1883.

Registration of New Companies.

The following joint-stock companies have been duly registered:—

H. Mulliner and Co. (Limited).—Capital 60,000*l.*, in shares of 10*l.* To acquire the business of a carriage manufacturer at present carried on by the founder, at Leamington, Warwick, and Northampton, under the firm of H. Mulliner and Co., and to carry on the business of carriage and harness manufacturers. The subscribers (who take one share each) are—Henry Mulliner, Leamington; Ernest Woodford Mulliner, Mountraith, Queen's County; Arthur F. Mulliner, Bridge-street, Northampton; Herbert H. Mulliner, Leamington: Annie R. Mulliner, Harvey Villa, Leamington; E. J. Fuller, Market Harborough; H. Sherratt, Leamington.

La Trinidad (Limited).—Capital 500,000*l.*, in shares of 5*l.* To adopt and carry into effect an agreement dated Nov. 24, 1884, made between James T. Browne, of the first part, John Charles Kemp Van Ee, of the second part, and Edmund Harvey on behalf of La Trinidad (Limited), of the third part, a copy whereof is set forth in the schedule of the Articles of Association for acquiring, developing, and working certain mining property called La Trinidad, situate in the district or province of Sonora, in the Republic of Mexico. The subscribers (who take one share each) are—Wm. J. Thomas, Bedford-road, Tottenham; Sydney G. Henton, High-street, Poplar; Horace C. M. Daniel, Elgin Crescent, Notting Hill; T. E. Williams, Hayter-road, Brixton Rise; W. B. Poublon, Fleet-street; W. J Twentyman, Amherst-road; F. Harslut, The Ferns, Witham.

Mersina Adana Construction Company (Limited).—Capital 103,250*l.*, in shares of 20*l.* and 5*l.* each. To undertake the construction and equipment of a railway from Mersina to Adana, in Asia Minor, pursuant to a firman of H.I.M. the Sultan of Turkey, dated Jan. 8, 1883. The subscribers (who take one share each) are—S. F. Easton, East India-avenue; E. W. Layton, East India-avenue; R. de Paula, Bishopsgate-street; T. Tubun, Ladbroke-gardens; Ross Taylor, Constantinople; James Hedander, St. James's-street; and Charles E. Musgrave, King William-street.

Madras Tramway Company (Limited).—Capital 185,000*l.*, in shares of 10*l.* To acquire the benefit of an agreement, dated Sept. 3, 1884, made between the Municipality of the City of Madras, and Messrs. Wier and Co., of the said city of Madras, engineers, to grant to the company for the construction, working, maintenance, and management of tramways and works in the city of Madras. The subscribers (who take one share each) are—Geo. Allen, Austin Friars Thos. S. Lindsay, Poultry; Edmund Kimber, Walbrook; Arthur Cusn, Cornhill; S. Lee Smith, Upper Ground-street; John Gwynne, Cannon-street; Augustus W. Biron, Austin Friars.

Elwell-Parker (Limited).—Capital 50,000*l.*, in shares of 10*l.* To purchase or otherwise acquire the business of electricians and engineers, lately carried on by Paul B. Elwell and Thomas Parker, of Wolverhampton, in the county of Stafford, under the styles of Elwell and Parker and the Wolverhampton Electric Light Storage and Engineering Company, and all land and buildings, machinery, apparatus, plant, stock in trade, goodwill, book debts, patents, &c., to carry on and continue and develope the said business. The subscribers (who take one share each) are—Charles Moseley, Ardwick, Manchester; William A. Turner, Pendleton,' Salford; J. C. Waterhouse, Patland-street, Manchester; J. W. Silver-Warest, Georges-street; V. K. Armitage, Swinton Park; J. E. Sharples, Lincroft-street.

The Patent Metallic Stone Company (Limited).—Capital 51,000*l.*, in shares of 1*l.* To purchase the business of concrete manufacturer s carried on by William de Vere Bailey; also the letters patent of the manufacture of artificial stone. The subscribers (who take one share each) are—T. S. de Vere, Waterloo-road; W. de V. Bailey, the Outer Temple, Strand; J. Hatfull, Station-road, Kew Gardens; F. J. Holland, Trinity-terrace, Blackheath; G. Lovell, Borough-road; D. Irvine, Northumberland-street; V. H. Labrea, Finsbury Pavement, lieut.-colonel.

Tamar Tin Smelting Company (Limited).—Capital 25,000*l.*, in shares of 1*l.* To give effect to an agreement dated July 2, 1884, and made between John F. Pagen, of George-street, Plymouth, stock broker, of the one part, and Mr. J. Adams, on behalf of the company, of the other part, for the purchase of the whole right and interest of the said John F. Pagen of and in certain premises called Higher Tamar Smelting Works, situate in the parish of Beerferris, in the county of Devon, and to purchase plant or personal property appertaining to smelting in England and Wales. The subscribers (who take one share each) are—John F. Pagen, George-street, Plymouth; Wm. J. Adams, George street; O. S. Dyer, Kobe-terrace; Edw. Earwaker, George-street; W. Warren, Widcombe-crescent, Bath; H. N. Nevins, Collings Park; Josiah J. Reeby, George-street.

Standard Electric Light and Power Company (Limited).—Capital 200,000*l.* in shares of 10*l.* To acquire by purchase the sole right to use, sell, or deal in, in all parts of Great Britain and Ireland, electric piles or batteries constructed in accordance with a process patented by Felix de Lalande, and to acquire other patents for improvements in galvanic batteries, and to carry on the business of manufacturers of all kinds of electrical appliances. The subscribers (who take one share each) are—Charles S. Blair, Pall Mall-place; Richard H. Baillie, Albemarle-street; Thomas Ronne, Charlton; S. Mure, Teyussion; E. Downwell, Malvern-road, Dalston; H. Enoon, Felney Crescent, Stamford Hill; William H. Kay, Custance-street.

Rapid Production of Railway Plant.—The altogether unparalleled feat of building 100 freight cars in 9 hours was performed in the freight cars shops of Pullman's Palace Car Company, at Pullman, Illinois, on Aug. 18. The cars were flats, and formed part of an order for the Vicksburg, Shreveport, and Pacific Railway Company, which desired to have them delivered as soon as possible. The task was accomplished without any special extra preparation. The work was laid out as usual on Saturday—that is, five sets of wheels and axles were placed on each of the seven tracks used in the work, and the materials for each of the cars were placed along the tracks in the usual manner. When the whistle sounded at 7 A.M. the men sprang to their work. Of the 29 gangs, 28 consisted of four men each, but the best gang was one hand short, because of sickness. The three men preferred to do the work themselves rather than take on a fourth hand. The first completed car was turned at 9·15 A.M., and the first lot of 12 completed cars was pulled out of the shop at 10·40 A.M. The hearty interest felt by all the men in this splendid contest was shown by the cheers which rang along the lines when this first finished lot began to move out of the shop. The writer reached the scene at about 4 P.M. and found the floors being laid on the last two or three of the 100 cars. It is within bounds to say that the whole number was finished by 5 P.M., and by 6 P.M. 24 of them were lettered and ready to ship. The remaining 76 were lettered and shipped during the next day.—*Railway Age.*

New Pier at Folkestone.—Messrs. Heenan and Fronde, bridge builders and engine makers of Manchester, have secured a contract for the construction of a new pier for the Folkestone Pier and Lift Company, which is to be carried out from the designs, and under the supervision of Mr. John Wilson, M.I.C.E., Deans-yard, London, the South-Eastern Railway under Sir Edward Watkin, being also large shareholders in the undertaking. The pier is to be about 500 ft. in length and 30 ft. in width, terminating with a platform in the form of a cross, 60 ft. by 90 ft. It will also be furnished with promenade concert-rooms, but these instead of being at the end of the pier will be about 120 ft. from the shore end, so as to be available in all weathers. We understand that the work is to be commenced early in the spring, and to be finished at the end of the year.

S THE AMOUNT OF GOLD IN CIRCULATION THROUGHOUT THE WORLD SUFFICIENT FOR THE REQUIREMENTS OF COMMERCE, AND CAN WE INCREASE THE SUPPLY?

BY GEORGE O'BRIEN.

The United States of Colombia under Spain for more than 250 years employed annually thousands of slaves washing for gold, as well as all other provinces in South America, but no exact record shows the entire amount produced, being about 40,000,000*l.*, and the washings and mines in Colombia still yield about 200,000*l.* per annum. Mexico appears by its annals to have yielded in 300 years about 37,000,000*l.* from alluvials, and assisted from lodes in alloy with silver, as in the State of Nevada, U.S.A., but it was chiefly dedicated to silver, of which it produced from 1804 to 1848 to the value of 140,000,000*l.*, and at the present time does not produce much gold, and the silver mines are not very prosperous. And it is manifest that gold washing from alluvials by manual labour was formerly the lot of the slave, and that the available alluvials exist generally in localities where water has now almost ceased to flow, and also that unless some other contrivance be employed that our present supply will diminish. Our hopes were centred on the skill and intrepidity of the Americans in California, but even they have paused in its pursuit, having been, as is usual with beginners, too sanguine and exhuberant at the outset, working hundreds of mines and diggings not having the necessary characteristics for profitable results.

In the year 1849 the State of California, in U.S.A., was invaded by hardy and intelligent bands of mining adventurers from all parts of the world, said to exceed 500,000 persons, and the greater part of whom perished from sickness and toil in 10 years. They began by washing surface gold, but this mode of labour there has since been abandoned to the Chinese coolie working on their residium, and with comparatively profitable results, and then their own energies and power of invention were directed to explore deeper and more permanent depositions, and which they designated as "hill diggings," being huge ridges of gold-bearing alluvium several hundred feet thick, the clayey remnants of huge mountains, extending over lengths of 40 miles and more, burying the lines of ancient rivers, once channels of the water from the snow-capped mountains which formerly existed there. They attacked these huge auriferous deposits by means of hydraulic mining at enormous outlay in canals, aqueducts, tunnels, and iron pipes to convey the necessary supply of water around the sides of the hills, and across deep valleys. But this system requires 17 tons of water to deal with 1 ton of gravel, delivered at a pressure of from 40 to 200 lbs. to the square inch, and the profits resulting from it are very speculative, as the ground to be worked for gold cannot be properly tested until the water arrives upon it, and the gold is very unequally distributed throughout the alluvium. Thus, for example, we take the investments of the Excelsior Water Company, with its eight amalgamated canals, costing with interest of capital nearly 200,000*l.*, for the purpose of supplying with water several mining claims now extinct, and one of these—the Blue Gravel Mining Company—washed down in four years 1,000,000 cubic yards of gravel, using 17,000,000 tons of water. The gravel operated upon was supposed to contain an average of above 20 cents of a dollar in gold per cubic yard, but such previous estimates of averages require explanation, as the upper gravel is very poor, and the lower stratifications may contain above 50 cents per square yard, and the richest concentrations always lie in the silt reposing on the bed-rock of the dyke, or ancient river beds, and thus the difficulty of working out the lower concentration increases as the work advances into the alluvium by this process. And this is verified in the operations of this company, whose gross yield from the million tons specified was only $837,399, instead of the $2,000,000 calculated upon, and thus we find that in the year 1866 the returns of the Blue Gravel Company paid all the costs of the developments, because at first they had a lower frontage exposed, but in 1867 assessments were paid by the owners to meet the costs arising from the sinking of two new shafts, and driving fresh tunnels to work the lower concentrations. But this system, even if it were effective or profitable as a mining operation, is now prohibited by the State Government as prejudicial to the general interests of the public, as the vast quantities of material which it so suddenly removes by force of water from many such companies, is merely shifted into the shallows beneath, to be redistributed at every freshet to points lower down, until it reaches the sea coast, creating bars at the mouths of rivers in its course, and changing the hydrography of harbours by its silt, as it has done with the port of San Francisco de California. The hills behind torn up and ravaged by the gold miner are abandoned as desolate and irredeemable; and the costly canals, constructed with peculiar conveniences for mining purposes, eventually fall into disuse, from being too expensive to maintain, or to alter for other uses. Therefore, for many reasons, such a system is impracticable; but we are greatly indebted to these adventurers for their costly experiments, as they have shed a flood of light for our future explorations in gold alluvials, and evidences also the wisdom of the ancient Indian and Peruvian miner in his method of sinking innumerable shafts through the alluvium down to the bed-rock, and shows us that we should only work out the lower concentrations, following it as in a coal mine, and support the firm conglomerate above by pillars made from the huge boulders which repose in all alluvials. In 1858 California alone had 6000 miles of mining canals, constructed at a cost of 3,000,000*l.*, and these now are mostly in disuse. By these gigantic operations we increased our stock of gold, but with heavy loss to the investors, as we have also from mining on the Comstock lode, extracting gold in alloy with silver.

The operations executed at this mining district in the State of Nevada, U.S.A., have been very rapid and extensive, partly from its being the most favoured mining district in the world, and also from the extreme width of the deposits on this lode, and fear that the timbers would rot and the mine fall together. It is surrounded by dense forests, containing trees of the largest growth, and is supplied with sufficient water for all metallurgical purposes. In mining parlance this is a "mother lode," and the greatest mining feat of the century has been performed here, at the Virginia Consolidated Mine, which had the extreme width of 300 ft. in ore, continuing to a depth of over 2000 ft., arriving then at dead or barren ground. The value of the ore per ton was about 10*l.* average, having 33 per cent. of its value in gold and 66 per cent. value in silver, and as orey ground above the barren ground reached a phenomenal thickness so a corresponding depth of barren stratification may be expected, as such depositions are symetrical. All modern skill and adequate machinery regardless of cost was here employed with day and night labour to arrive at an output of 300 tons of ore per day of 24 hours from such great depths, and its energetic owner exhausted the mine in 10 years, expending in timber alone more than 200,000*l.* sterling to insure the safety of the operatives and prevent the mine from falling in, and only about six other mines on the Comstock lode were famous in their time a few years previously; but several hundreds of other mines of a purely speculative character were sunk near them, but without mineral contents, as the neighbouring veins to such powerful lodes are generally barren and worthless. The Sutro tunnel of 4 miles in length now taps beneath these once rich mines, having had for object extraction downwards, to save the cost of lifting produce and also to drain out the water, and to supply air by ventilation instead of forcing it down by machinery. The cessation of mineral supply from these mines has caused a notable diminution in the yield of gold from the United States; but its yield and from other States in the Union facilitated by its circulation their return to specie payment; but no great increase can be again expected from here, and such productive lodes are rare in the world. The yield of gold from the State of California alone in 30 years, dating from 1849, reached the enormous value of 292,000,000*l.* sterling, and the other States and territories 35,000,000*l.* more, making a total of 327,000,000*l.* And from the year 1849 to 1879, during the period of its extraction, was a happy epoch in the world's history, during which it enjoyed unexampled prosperity. But in 1881 the output of all the States combined was reduced to 4,700,000*l.*, and with the probability of further reduction in future, and with the reduced yield from Australasia and elsewhere has caused the present decrease of money in circulation, and consequent depression in trade. And at the commencement of this golden era the price of copper rose to above 130*l.* per ton, and now sells at 52*l.* per ton, and the Republic of Chili alone exported then three-fifths of world's production, and its value with that of the nitrate and guano deposits of Peru, and loans to their Governments drew gold from its slumber, and with that of California also in circulation, gave a generous impulse to commerce. But all this gold with all loans to foreign countries has returned chiefly to ourselves (as they have none left) to again sleep until dispersed by force of circumstances. But during this epoch statisticians conceiving that the supply of gold was perennial disestablished silver, and thus decreased purchasing power. The result of this temporary increase in circulation was marvellous, as the numerous costly railroads in Peru, Chili, and throughout the world bear witness, and our carrying fleet was transformed easily from sail to steam power, and even our own railway mania was inspired by this overflow of circulation and combination of influences, and our intermediary panics were only caused by alterations in business, resulting from machinery, inventions, and improvements, and more rapid communications with other countries. The British possessions of North America have yielded in many past years 940,000*l.* in gold per annum, but is now decreasing. Australasia in past years materially assisted our circulation; but advices from those auriferous regions have latterly exhibited great diminution in yield; but the output from all the colonies there amounted in 1867 to 7,500,000*l.* sterling, but now does not reach 3,000,000*l.* annually, and with expected decrease.

The statistics of the precious metals, and particularly of gold are very misleading, unless to instruct us of its history, and to exhibit that the amounts in actual circulation are the accumulation of all past ages, and that before the discoveries in California in 1848, the annual yield of the world was only 8,000,000*l.* sterling in gold, and that the present yield of silver from all parts does not exceed 10,000,000*l.* annual value. I have over-estimated the annual yield of the world in gold at 14,000,000*l.* annually, but this matters but little when we consider how this is disposed of, and that about 9,000,000*l.* sterling gold is annually required in the arts and jewellery, and about 2,000,000*l.* more are hoarded by Asiatics, and remains out of circulation. And the only real cause why the Jews in all ages have been considered as inconvenient subjects is on account of their national and hereditary habit of "cornering" gold, and for this reason they have been persecuted in every country in every part of Europe, as they were thought to be the cause of decreased circulation, and consequent depression in trade, but in reality they have been its chief conservators and have maintained its supremacy and value.

The money advanced to foreign bondholders can never be repaid unless silver be readmitted as currency, and any endeavour to force payment can only bring about repudiation and disaster. The fall in the price of silver since much of this money has been advanced is 19 per cent. in value, and as there is no gold except in the hands of the "cornerers" and bankers, the unfortunate creditor has to purchase gold to pay interest at discount of 19, and thus a little over every five years has really repaid the entire amount of the primitive loan, but if a change be effected they may return to payment, as it is not so much the amount of debt which weighs upon those countries, as the insufficiency of their revenues valued in gold to be procured only by exchange with money brokers.

The present state of Egypt has been brought about by those unsound and unfair conditions, and she can never free herself from bondage unless these causes be recognised and remedied, and a usefut text might be read to foreigh bondholders. "Take thy pound of flesh, but if thou shed one drop of blood," &c. The continued reign of prosperity and power centred in the governing classes of this country arises from our happy insular position, mineral wealth, and the inclemency of our climate, compelling every individual to work, or suffer privation and want. Thus every working man, woman, and child who pass us anxiously in early morn to their daily labour contribute to and support the national exchequer by transforming the raw produce imported into manufactured articles, and which are reshipped to foreign countries. They, therefore, are only national machines, and accumulated gold should be considered as the storage of their force and labour, and in which they have a moral interest, therefore it behoves us to watch its effect and governance, or conflicting causes may arise and derange its power. A golden age has been achieved in a comparative degree by the commercial centres of every country in the world, and their rise or fall should afford a lesson to ourselves. In ancient times, as examples, flourished those famous marts, Tyre, Sidon, Carthage, and Venice. "But where are now the fleets of Tyre, those dockyards of Arad, those workshops of Sidon, and that multitude of mariners, merchants, and soldiers? Their temples are thrown down, palaces demolished, ports filled up, towns destroyed, and the earth, stripped of its inhabitants, seems like a burying place."—(Volney.)

These rose by commerce, and at ebb tide fell, having first excited admiration, worship, fear, and in succession envy and hatred. They were apparently firmly established, situated in fine climates, fomented by auriferous regions. They were the seats of the then civilised world; but as other populations advanced, and they were tyrannical in their sway, these centres of commerce were removed to improved and more convenient localities, their golden wealth having been conquered from them, or gradually conveyed to new centres, and thence in succession to the present generation of the world. Therefore, we must bear in mind that our circulation represents the labour and sufferings of untold millions of our predecessors, and who had at their discretion the richest alluvials of Asia, Africa, and America, with abundance of slave labour. How then can it be sufficiently increased to meet the expansions of commerce and increased values of property caused by latter inventions? Our Continental neighbours in simultaneous activity have lately exhibited more than ordinary national restlessness in their late colonial adventures in Africa and Asia; both localities credited with great mineral wealth, and we may reasonably conjecture that they will be deceived about gold; but that they have concerted views and correct ideas on the subject of a famine in money, anticipating with sagacity the coming crisis, and are making an effort to sustain their expanding but injured industries. "Over production" is a selfish and hackneyed phrase, with our carrying fleet of vessels in langour and despair, and mankind in want of the necessaries of life, the produce of manufactures.

Free Trade does not exist whilst gold remains the paramount legal tender, as its scarcity hampers commerce, and checks Fair Trade and freedom of exchange, and other countries would be greater purchasers if another more abundant metallic medium were admitted as an assistant; nor would all the silver in the world be sufficient for the purpose, and also to redeem the paper currency which bankrupt States have necessarily emitted from deductions chiefly required by financial exchanges for the benefit of the few bullion-holders. We have more largely invested our earnings in railroads, docks, manufactories, buildings, and carrying fleets, than any other nation, but these, with all land estates, produce, and other property, will gradually shrink in value, subject to the mercy of gold, as it passes into fewer hands. I have endeavoured to show that the manifest cause of the great depression in trade with ourselves, and throughout the world, and consequent distress and discontent amongst nations has a hidden but powerful cause, and easily traceable to the want of a more abundant representative of values than gold. And having carefully examined the chief auriferous regions mentioned, and enquired of those I have not visited, have, therefore, imported as chief factor in the argument the paucity of gold, and also the time required for its accumulation, and methods employed in collecting it, being those very necessary parts not generally known and understood, and about which so much stress and sophistry is used, based on statistics compiled by persons unaware of its detailed history and origination, increasing thereby the difficulty of statesmen, politicians, and trade statisticians to form correct conceptions on the subject, in order to formulate economic theories regarding currency in general, and its prospective influence on trade and property. The subject demands attention, or inevitable disasters will result to national and individual interests, as rapidly and silently has a blight been creeping over us, but mankind will soon perceive it, and revolt from its pernicious tyranny, and insist on an increased circulation to promote reciprocity and prevent general insulation.

The restoration of silver to its old position as a bi-metal with gold would increase monetary circulation by about 70 per cent. at most, remaining probably in the ratio of 15 per cent. gold to 10 per cent. silver, based also on the supposition that silver would again rise about 19 per cent. over its present rate, or (say) to about a par of 20 shillings coin to the pound sterling; and this increase of medium would relieve mankind and general trade by assisting bankrupt nations to solvency, instead of draining their remaining resources. At the present moment the granaries of the world are filled to overflowing, and warehouses crammed with merchandise; but these, with all products of industry and landed property, have decreased in value 10 per cent. since last year, and sales impossible even at further reduction, and the unfortunate producer of each speciality, in his endeavours to maintain existence, must continue to produce greater amounts at lower rates, until thoroughly prostrated, and estates worn out and abandoned, with industries destroyed, as no reaction is possible under the sole control of gold; and it will be found in future experiences that silver is not so plentiful in Nature as is generally supposed, being a product resulting from deep mining only, and that, like gold, it has been worked for ages past, and therefore comparatively is as much exhausted as its associate metal. Our Indian Empire, with military and civil service, would be particularly benefited by the change, and their now slumbering silver be brought into enhanced and useful circulation, and by its expanded value capital made able to continue the necessary railways for its vast population.

SUMMARIES OF YIELD OF GOLD THROUGHOUT THE WORLD.

Europe, extracted from imported ores and mines	£ 438,500
Asia, " " alluvials	1,631,500
Africa, " " alluvials	1,300,000
North America, United States, mines and alluvials	4,700,000
" " British possessions, alluvials	940,000
South America, chiefly from alluvials	790,000
Australasia, " "	3,000,000
Additional amounts possibly unaccounted for.....	1,200,000
Total.....	£14,000,000
Used in the arts, jewellery, &c.	9,000,000
Balance for increase of circulation.....	£5,000,000

THE LEAD INDUSTRY OF THE UNITED STATES.

Lead mining in the United States is an industry of considerable age, for during the early part of the present century work was conducted in the Eastern and Southern States. Prof. KIRCHHOFF, jun.'s, report to the United States Geological Survey says that for a long period the output of the mines of Missouri and the Upper Mississippi region constituted the bulk of the make of the country, and between 1840 and 1848 it became so great that considerable quantities were exported, the maximum being reached in 1844, when 8223 tons went abroad. In 1850 the tide set in in the other direction, nearly 16,000 tons being imported, and this movement continued for some years until a growing home production crowded out the foreign lead. The bulk of pig-lead imported in recent years has been re-exported under the drawback clause being chiefly used in the manufacture of solder for tin cans. The smelting of lead has, as may be imagined, very much developed of late years. In 1870 the desilverising and refining works of the Germania Company, at Utah, were started, and though being suspended in 1875 were again put in operation in 1878.

Statistics show that the production of lead in Utah rose from 5000 Yankee tons in 1871 to 30,000 Yankee tons in 1882. At the present time the chief mine in this district is the Horn Silver, which in 1881 made 8171 tons of base bullion, and increased in 1882 to 16,002 tons. The dividends in this mine during 1882 amounted to $1,200,000*l.*, while the net receipts from the sale of lead were $1,326,664, thus indicating that the silver paid for nearly the entire cost of extraction, treatment, administration, and marketing. While this does not apply to all the Utah mines, it furnishes a striking illustration of the advantage of the presence of silver in the ore of the Rocky Mountain States and Territories. In the Nevada Territory almost the entire product has come from the Eureka district, in which the two principal mines are the Richmond and the Eureka. The ore occurs in large chambers, and the mines, have, therefore, periods of great prosperity, alternating with others when extensive development and prospecting work must be carried on. Recently the Richmond has drawn heavily upon its reserves without opening out new ore bodies. The Richmond lead being refined at Eureka has usually been placed in the East, while the base bullion turned out by the Eureka Company goes to San Francisco for desilverising and refining the greater part of it, therefore finding a market on the Pacific Coast. By far the heaviest contributor to the lead supplies of the States is Colorado, yet it is the latest important addition to the ranks. The development of the industry is remarkable, for whereas in 1873 the estimated net produce was only 56 net tons in 1882 it had risen to 58,642 net tons. The enormous increase is exclusively due to Leadville, which accordi ing to statistics produced in 1882 39,864 tons of lead. Considerable quantities of galena are produced by the mines of Georgetown, in Clear Creek county, and by the San Juan district, which includes the counties of Hinsdale, Ouray, San Miguel, La Plata, San Juan, and Dolores.

Montana during the past few years has produced increasing quantities of lead. Large bodies of low grade ore are known to exist, and very elaborate, though misdirected, efforts have been made in one or two instances to work them. Other efforts under careful management have been rewarded with success. It is probable that the advent of the Northern Pacific railroad will do much to stimulate this industry, and place Montana in a position to contribute more largely to the supply of the country. Important developments are looked for in the Wood River country of Idaho. Numerous and large deposits of ore high in lead have been opened, and a number of smelting works have been built, and now that the district has been tapped by a branch railroad production will probably be considerably stimulated. South-western Missouri and South-eastern Kansas have become the seat of a very important lead mining and smelting industry. The mines of Missouri in spite of frequent predictions that they would be crowded out by the competition of the silver-lead mines of the Rocky Mountains, have held their own remarkably well. Lead has been produced in minor quantities in almost all of the other States and Territories of the Far West, though never in quantity to appear as a factor in the markets of the country. Argentiferous lead ores are found in many portions of California, especially in Mono, Inyo, and neighbouring counties.

Regarding the market, Prof. Kirchhoff says that, during the first six months of 1883 prices ranged from 4·70 down to 4·40 c. per lb. Opening quietly, though with some firmness, notably in the West, until, in the beginning of the month of March, about 3000 tons were taken principally by the trade, an effort to depress prices being made later in the month by additional sales at lower prices. April passed quietly, while May opened with the placing of about 3000 tons amongst the consumers on the part of the representatives of two large works. Buyers were thus tolerably well supplied, especially as the demand for manufacture during the first quarter of the year was light. The result has been an accumulation of supplies, which is looked upon with solicitude by many, though the principal blocks of stock are held by strong parties. It is argued that, with the production going on at an unabated rate, while the consumption, notably in the East, has fallen off very materially, prices must come down.

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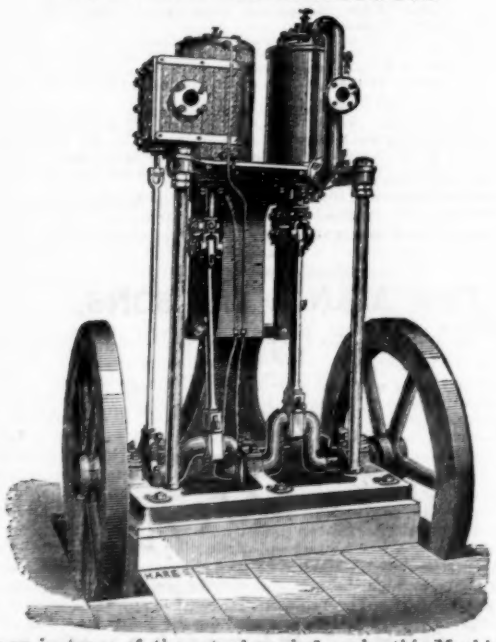

As an instance of the actual work done by this Machinery in various kinds of ground, some of it the hardest rock, it may be mentioned that in Cornwall, irrespective of the work performed by the "Champion" Rock-borers and Air-compressors purchased by various Mines, the drivage, rising, sinking, and stoping done by contract by the Proprietor with his own Machinery now amounts to over 1350 fathoms.

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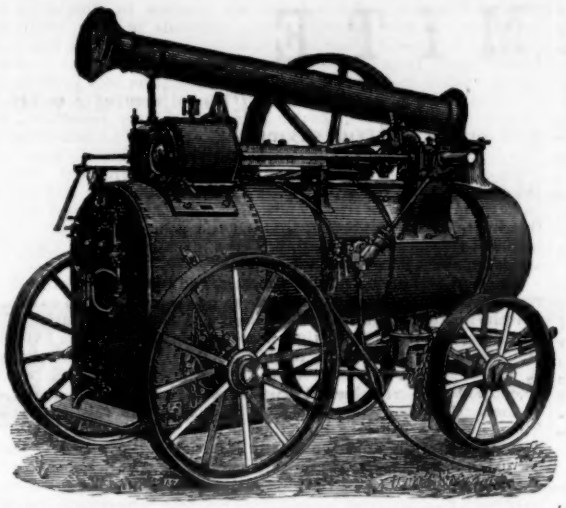

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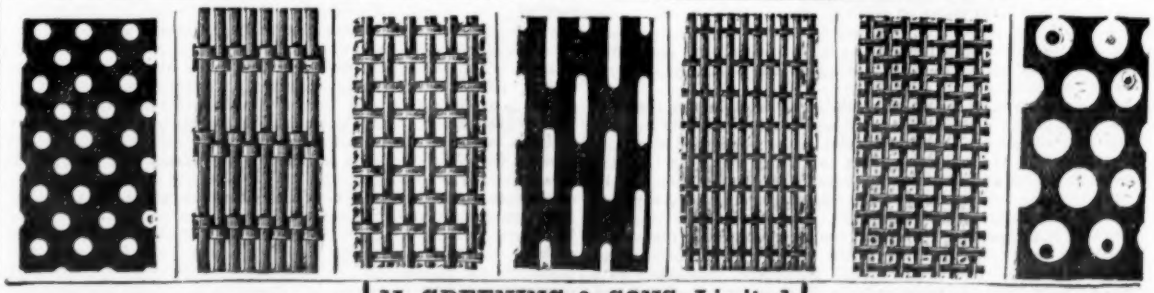

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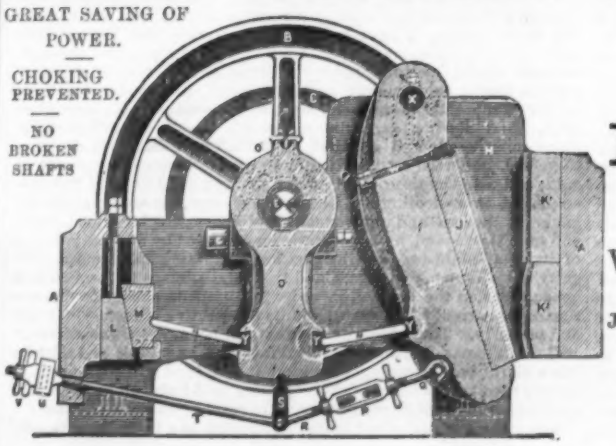
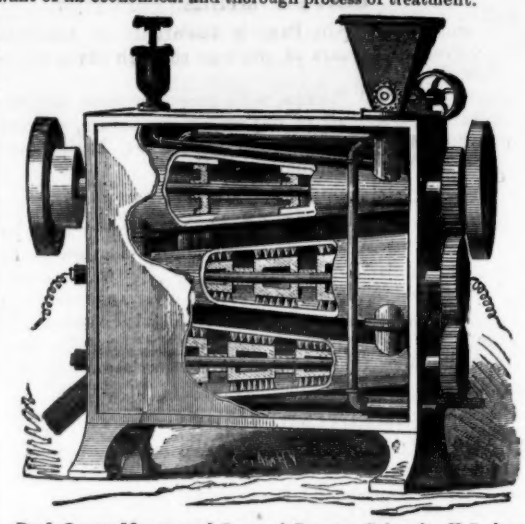


PRICES, PARTICULARS, AND TESTIMONIALS ON APPLICATION.

NOVEL ELECTRO METALLURGICAL MACHINE.

PROFESSOR JAMES MANES AND SONS call the attention of miners, mineowners, capitalists, and others interested in the working of gold or silver mines to their new Electro Metallurgical Machine for extracting fine and rusty gold from sands or tailings of stamp mills, or the sands of hydraulic gold diggings, or from the black sands on the coast of Oregon or California, and other parts of the world where gold is found.

The problem that has long troubled the worker of free-milling gold and silver ores is a method to save the mineral now lost in the tailings of stamp mills or flumes. This alone, if it could be saved, would amount to many million dollars profit each year, besides enabling the working of much territory which is now lying idle for want of an economical and thorough process of treatment.



Prof. James Manes and Sons, of Denver, Colorado, U.S., have invented a machine (represented in the above engraving) which it is claimed will save nearly the entire amount of mineral which passes through it, the loss not being over 10 per cent., and in many cases not in excess of half that amount. The machine is a cheap and practical process—it never need stop for charging or cleaning up, being nearly self-acting. Steam, electricity, and mercury are used in the process of extracting the mineral.

This machine or amalgamator is adapted for free-milling gold or silver ores, or refractory after roasting. It consists of a series of three or more large cylinders, wider at one end than the other, placed one above the other in a horizontal position, a shaft or spindle running through the centre of each.

The ore and mercury are fed into the first cylinder, passing into the second, and then to the third. The first cylinder is furnished with steel mullers which nearly touch the sides of the cylinder, and revolve at a good rate of speed, mixing the mercury and ore. The second cylinder is furnished with large steel brushes attached to the shaft or spindle, revolving at a high rate of speed; through this a current of electricity is furnished by a Westinghouse dynamic electro machine, which materially assists in gathering the particles of very fine gold together, and thoroughly amalgamating the metal and mercury. The third cylinder is similarly furnished to the second; into this the amalgam passes, and is again acted upon and mixed by the brushes to catch any gold which might have escaped amalgamation in the second. A fourth cylinder may be used if found necessary.

The amalgamated pulp then passes through a revolving copper drum, plated with quicksilver inside. As the drum revolves it takes up the most part of the amalgamated gold. As the inside of the drum is constantly washed with a spray of water from perforated pipes fixed inside of said drum, a clean-plated surface is constantly brought in contact with the pulp or tailings as it passes out from the cylinders. After leaving the drum it falls down on to incline copper plates, the same as is now used in stamp mills.

The amalgam can be collected from the drum and plates without stopping the machine, and any live quicksilver that passes will be caught in syphons. The tailings are carried off with the water. The machine when attached to the flume will be driven by the waste water; it sifts the fine sands from the coarse gravel, and amalgamates it as above.

The specific points claimed by Prof. Manes and Sons in their patent are—

1.—The saving of almost all the mineral passing through the machine.
2.—The loss being less than 10 per cent.
3.—The entire absence of loss of the amalgamated material, thereby saving all the mercury, which, with the processes now in use, there is a large loss both of mercury and the precious metal.
4.—The small cost per ton at which the ore can be treated.

By the addition of the powerful current of electricity that passes off the revolving brushes, the most minute particles of gold will be caught and retained, which in the ordinary flume and stamps passes off with the water; this often amounts to a large percentage.

The inventors state that if English stock companies will give their assistance to work the black sands of Oregon and California by paying for the building of the machines, they will take a share of the gold for their services, or they will send their machines to any part of the world, or will sell patent rights to those desiring any of their patent machines or revolving furnaces for roasting or smelting ores, ball pulverisers, &c.

Prof. James Manes and Sons are agents for the Morey and Sparey Ball Pulveriser, that crushes and pulverises at the same time, and does as much work as eight stamps in a day, crushing either wet or dry.

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Printed by RICHARD MIDDLETON, and Published by HENRY ENGLISH (the Proprietors), at their Offices, 26, FLEET STREET, where all communications are requested to be addressed.—*December 6, 1884.*